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PH. SCHUSTER, PAPIERHANDLUNG

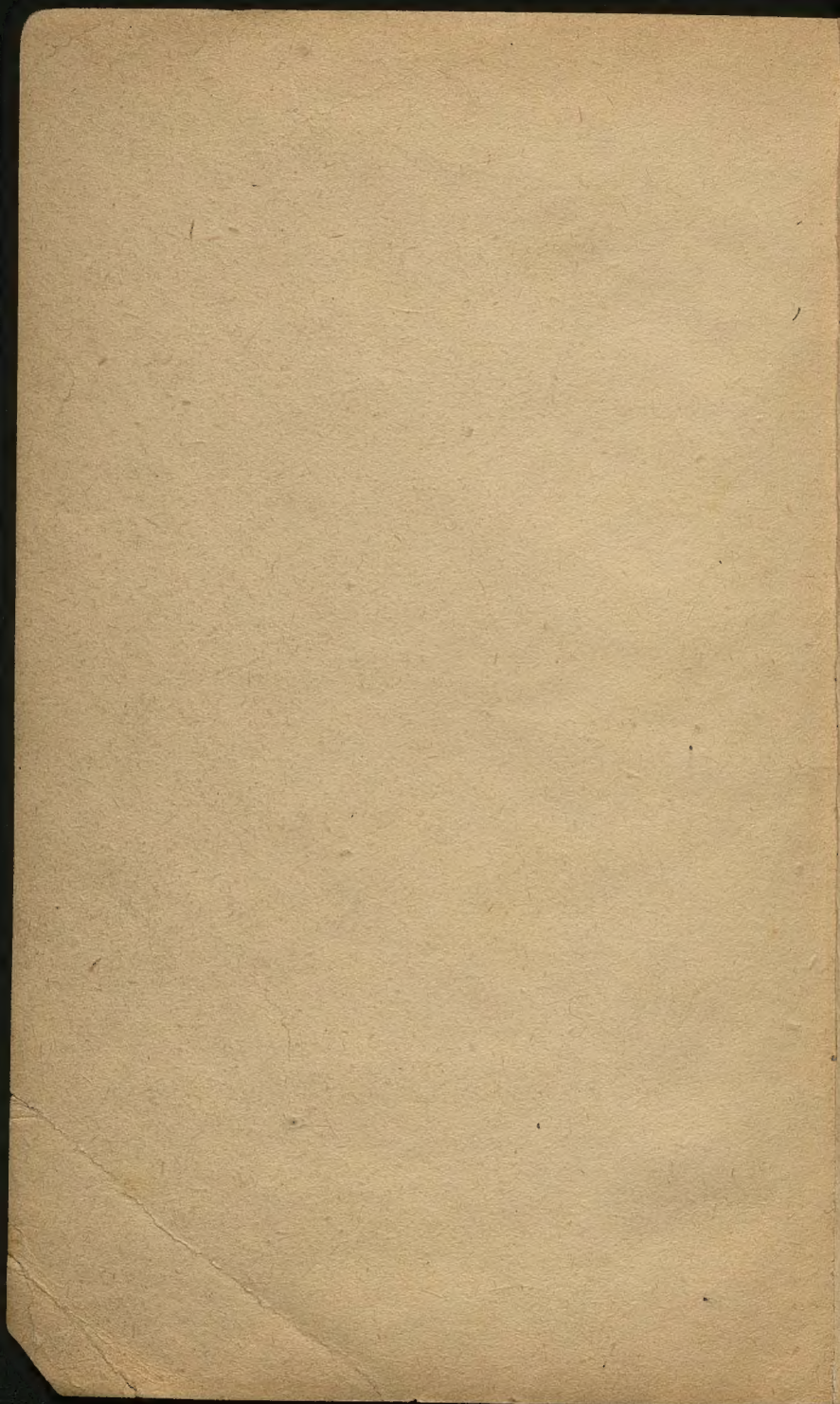
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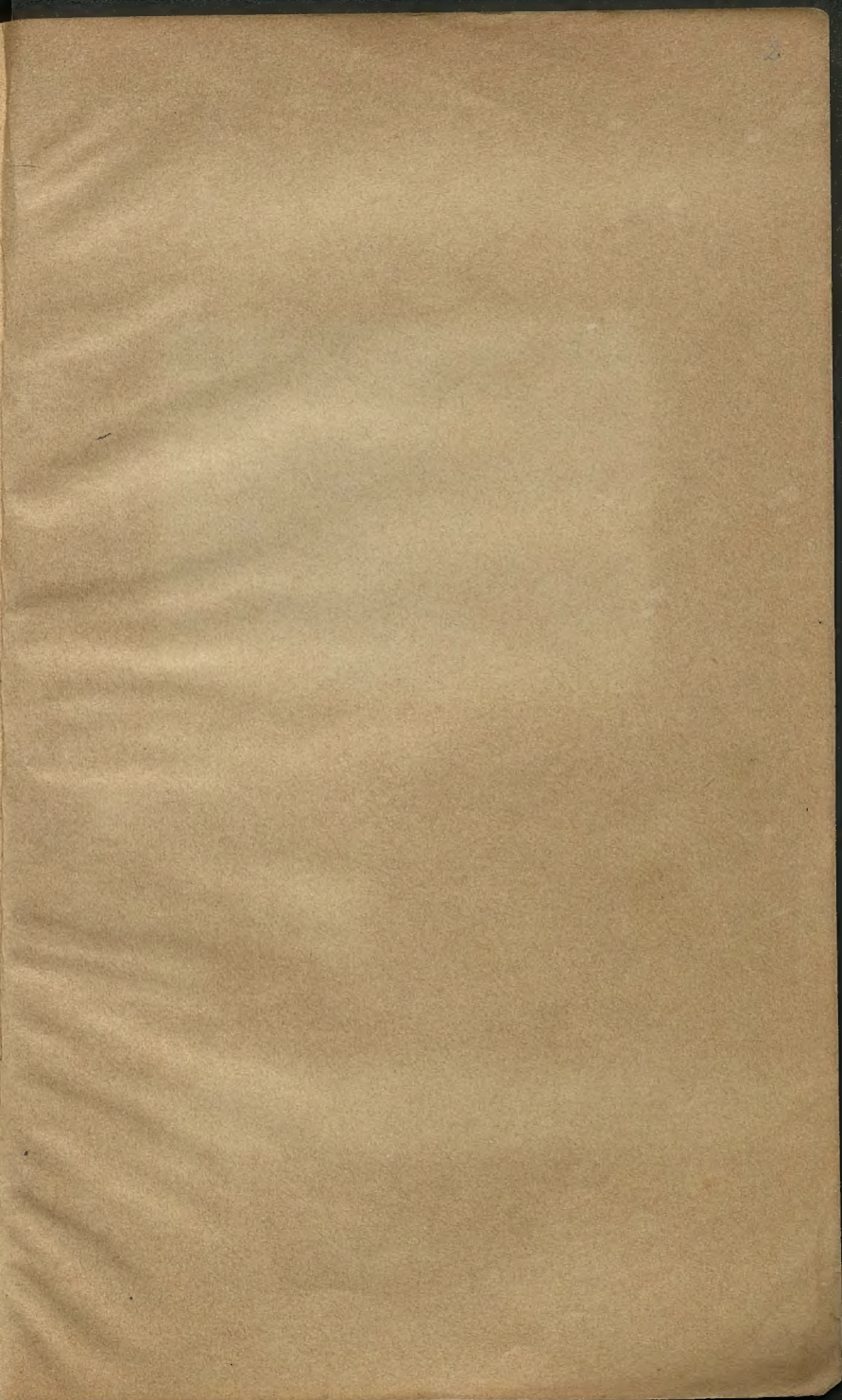
Dr. Josef Stefan

Magnetismus u. Electricität.

Abmolekularer

Wien, Wieden Hauptstrasse 55.



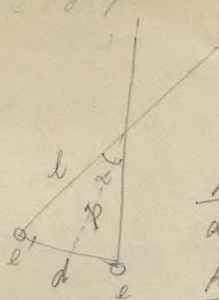
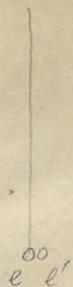


100

$\epsilon \perp f$

$T = \text{Tension coeff.}$

4



$Ta = \dots$

$\frac{A}{d^n} = /$

$\frac{A\mu}{d^n} = T\alpha$

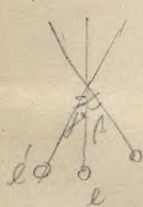
$p = l \cos \frac{\alpha}{2}$

$d = 2l \sin \frac{\alpha}{2}$

$\frac{A l \cos \frac{\alpha}{2}}{2^n l^n \sin^n \frac{\alpha}{2}} = T\alpha$

$\frac{A l}{2^n l^n T} = \alpha \sin^{n-1} \frac{\alpha}{2} \tan \frac{\alpha}{2}$

$\alpha \sim \dots$



\dots

$T(p+\rho) = \frac{A l \cos \frac{\alpha}{2}}{2^n l^n \sin^n \frac{\alpha}{2}}$

$\frac{A l}{2^n l^n T} = (\rho + p) \sin^{n-1} \frac{\alpha}{2} \tan \frac{\alpha}{2} \quad \left. \begin{matrix} \\ \end{matrix} \right\} n=2$

$\frac{A l}{2^n l^n T} = (\rho' + p') \sin^{n-1} \frac{\alpha'}{2} \tan \frac{\alpha'}{2}$

\dots

\dots

\dots

side then? and then better than ever for us.
 as in the case of the first one.

in fact: $\varepsilon \frac{e e'}{r^2} = 1$ $\varepsilon r^2 = 20 \text{ cm}^2$

for the first one was 10. in the second one was 20.

$\varepsilon r^2 / 6 = 20 \text{ cm}^2 \cdot 6 = 120 \text{ cm}^2$ - given 121 cm²

$P = Mg$ $M = 1$ $g = 1$ $P = 1$ $g = 1 \text{ [cm]} \cdot 1 \text{ [sec]}$
 $20 = 1 = \text{cm}^2 \cdot 6 = 120$

and the limit of the first one is 10.

$\varepsilon \frac{e^2}{r^2}$ $\omega = e = e'$ $e \varepsilon = 20 \text{ cm}^2 \cdot 2 = 40$

$= 1$ $\frac{e^2}{r^2} = 1$ $r^2 = 20 \text{ cm}^2$ $r = \sqrt{20}$

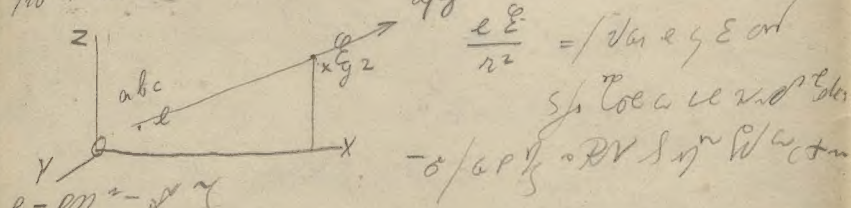
and the first one is 10.

$\omega = 1$, $r = 1$ $\varepsilon = 1$

and the first one is 10.

and the first one is 10.

20/10 = 2. 6 cm² = 120 cm²



$P = 20 \text{ cm}^2$

$2 < \frac{1}{2} \text{ cm}^2$

$r^2 = (x-a)^2 + (y-b)^2 + (z-c)^2$

$\cos \alpha = \frac{x-a}{r}$ $\cos \beta = \frac{y-b}{r}$ $\cos \gamma = \frac{z-c}{r}$

$$X = \frac{e\varphi}{r^2} \cos \alpha = \frac{e\varphi(x-a)}{r^3}$$

$$Y = \frac{e\varphi(y-b)}{r^3}$$

$$Z = \frac{e\varphi(z-c)}{r^3}$$

$$r \frac{dr}{dx} = x-a$$

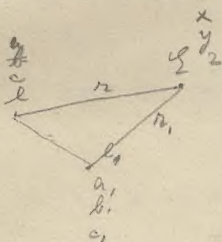
$$X = \frac{e\varphi}{r^2} \frac{dr}{dx} = -\frac{d}{dx} \left(\frac{1}{r} \right) = -\frac{d}{dx} \left(\frac{e\varphi}{r} \right)$$

$$\frac{x-a}{r} = \frac{dr}{dx}$$

$$Y = -\frac{d}{dy} \left(\frac{e\varphi}{r} \right) \quad Z = -\frac{d}{dz} \left(\frac{e\varphi}{r} \right)$$

p Comp. $\frac{1}{r} = \frac{1}{\sqrt{(x-a)^2 + (y-b)^2 + (z-c)^2}}$

$\frac{e\varphi}{r}$ = Potential φ at (x, y, z)



$$\frac{e\varphi}{r^2} \quad \frac{e_1\varphi}{r_1^2}$$

$$X = \frac{e\varphi}{r^2} \frac{x-a}{r}$$

$$X_1 = \frac{e_1\varphi}{r_1^2} \frac{x-a_1}{r_1}$$

$$X + X_1 =$$

$$r_1^2 = (x-a_1)^2 + (y-b_1)^2 + (z-c_1)^2$$

$$r_1 \frac{dr_1}{dx} = (x-a_1)$$

$$\frac{dr_1}{dx} = \frac{x-a_1}{r_1}$$

$$X_1 = \frac{e_1\varphi}{r_1^2} \frac{dr_1}{dx} = -\frac{d}{dx} \left(\frac{e_1\varphi}{r_1} \right)$$

$$X + X_1 = -\frac{d}{dx} \left(\frac{e\varphi}{r} \right) + \frac{d}{dx} \left(\frac{e_1\varphi}{r_1} \right)$$

$$= -\frac{d}{dx} \left(\frac{e\varphi}{r} + \frac{e_1\varphi}{r_1} \right) \quad \text{p. 68 p. 70} \quad \text{Pot. = Pot. zero}$$

or $\frac{1}{r} + \frac{1}{r_1} = 0$

$$\frac{e\varphi}{r} + \frac{e_1\varphi}{r_1} + \frac{e_2\varphi}{r_2} + \dots = \sum \frac{e\varphi}{r}$$

$= 2 \sum \frac{a}{2} \quad \rho \in \mathbb{R} = 1 \quad \omega^* \sum \frac{a}{2} = \text{Pot. in } \omega \in \mathbb{R} \quad \mathbb{R} = 1$
 $\rho \in \mathbb{R} \text{ ist die Dichte des Körpers; } \omega \in \mathbb{R} \text{ ist die Dichte des Körpers}$
 $\omega \in \mathbb{R} \text{ ist die Dichte des Körpers}$

$\sum \frac{a}{2} = U = \text{Pot. } \frac{1}{2} \times y^2$

$X = -\frac{dU}{dx} \quad Y = -\frac{dU}{dy} \quad Z = \dots$

$\omega \in \mathbb{R}$ ist die Dichte des Körpers; $\omega \in \mathbb{R}$ ist die Dichte des Körpers
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$dV = dV \quad \rho dV = \rho$
 $\rho \in \mathbb{R}$ ist die Dichte des Körpers; $\rho \in \mathbb{R}$ ist die Dichte des Körpers
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$\rho dV = \rho$

$\rho \in \mathbb{R}$ ist die Dichte des Körpers; $\rho \in \mathbb{R}$ ist die Dichte des Körpers
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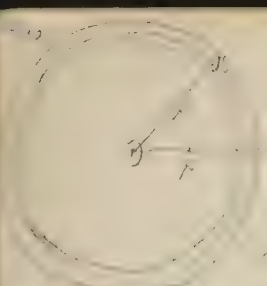
$$= \frac{2 \times 10^8 \times 10^8}{10^8} = 2 \times 10^8$$

$$= \frac{2 \times 10^{-10}}{10^{-10}} \times \frac{10^{-10}}{10^{-10}} = 2$$

$$= \frac{1}{2} \frac{d^2}{dx^2} \left(\frac{1}{x} \right)$$

$$-1000 - 1000 = -2000$$

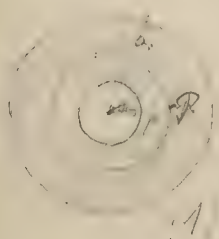
$\frac{1}{2} \left(\frac{1}{2} + \frac{1}{2} \right) = \frac{1}{2}$



$$U_1 = \int_{a_0}^r 2\pi p \cdot ds = 2\pi p \left[\frac{r^2}{2} - \frac{a_0^2}{2} \right]$$

$$= 2\pi p \left[\frac{r^2}{2} - \frac{a_0^2}{2} \right]$$

2. $U_2 = \int_{r_1}^{r_2} 2\pi p \cdot ds$



$$\frac{4\pi}{3} \left[\frac{r^3}{3} - \frac{a_0^3}{3} \right] \cdot p$$

$$2\pi p \left[\frac{r^2}{2} - \frac{r_1^2}{2} \right]$$

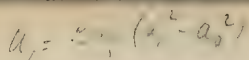
$$U = \frac{4\pi}{3} \left[\frac{r^3}{3} - \frac{a_0^3}{3} \right] \cdot p + 2\pi p \left[\frac{r^2}{2} - \frac{r_1^2}{2} \right]$$

$$= 2\pi p a_1^2 - \frac{4\pi p}{3} \frac{a_0^3}{p} - \frac{2\pi p}{3} r_1^2$$

1. $U_1 = \int_{a_0}^r 2\pi p \cdot ds$

$$U = 2\pi p a_1^2 - \frac{2\pi p}{3} r_1^2$$

$$\frac{dU}{dp} = -\frac{4\pi p}{3} r_1^2$$



$$U_1 = \frac{1}{2} \rho \dot{x}_1^2 - \frac{1}{2} \rho \dot{x}_2^2 - \frac{2 \rho g}{3} x_2$$

$$H_3 = \frac{1}{\sqrt{2}} \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$$

$$f(x) = U_1 + 2\pi i(a_1' - a_0') = 2\pi i + 2\pi i = 4\pi i$$

contin. i

[illegible]

$$2) \quad \frac{d\mu}{d\rho} = 0 \quad \frac{d\mu}{d\rho} = + \frac{2 \cdot \pi \cdot \rho^2}{3 \cdot \pi} = \frac{2 \cdot \rho}{3}$$

$$\frac{dI}{dt} = \frac{4\pi\sigma_0 r_0^2 - \sigma_0^2}{4\sigma_0^2} \quad \text{and} \quad \frac{dI}{dt} = 1.1 \times 10^{-11} \text{ and}$$

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10

$$dV = \dots$$

$$\frac{\beta(V_c)}{r_c} = 0 \quad r_c \frac{dV_c}{dt}$$

$$\int \frac{r^2 dr}{r} = \int r dr = \frac{r^2}{2} = \frac{1}{2} r^2$$

$\frac{1}{2} \pi \approx 1.5708$

$$- \frac{1}{2} \cdot \frac{1}{2} = -\frac{1}{4} \quad \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

R 67, 1. 1. 1. 1.

$$abc \quad 110 \leq p \leq 120$$

$$u^2 = (a-x)^2 + b^2 y^2$$

$$29. \frac{d^2}{dt^2} = - \sum \rho \frac{d^2}{dt^2}$$

$$r \frac{dr}{dx} = -a - x$$

$$\frac{dr}{dx} = + \frac{a+x}{r}$$

$$a-x = r \cos \theta \quad \frac{dr}{dx} = \frac{r \cos \theta}{r^2}$$

Then

$$\frac{dr}{dx} = \sum p dV \left[-\frac{1}{r^3} - \frac{a-x}{r^4} \frac{dr}{dx} \right]$$

$$= \sum p dV \left[-\frac{1}{r^3} + \frac{3(a-x)}{r^5} \right]$$

or $\frac{dr}{dx} = \frac{1}{r^3} - \frac{3(a-x)}{r^5}$

or $\frac{dr}{dx} = \frac{1}{r^3} - \frac{3(a-x)}{r^5}$

$$\frac{dr}{dx} = \frac{1}{r^3} - \frac{3(a-x)}{r^5}$$

$$\frac{dr}{dx} = -\frac{1}{r^3} + \frac{3(a-x)}{r^5}$$

$$\frac{d^2r}{dx^2} = -\frac{1}{r^3} + 3 \frac{a-x}{r^5} \frac{dr}{dx} = -\frac{1}{r^3} + 3 \frac{a-x}{r^5}$$

$$\frac{d^2}{dx^2} \left(\frac{1}{r} \right) = -\frac{1}{r^3} + 3 \frac{a-x}{r^5}$$

$$\frac{d^2}{dx^2} \left(\frac{1}{r} \right) = -\frac{1}{r^3} + 3 \frac{a-x}{r^5}$$

$$\frac{d^2}{dx^2} \left(\frac{1}{r} \right) + \frac{d^2}{dx^2} \left(\frac{1}{r} \right) + \frac{d^2}{dx^2} \left(\frac{1}{r} \right) = -\frac{3}{r^3} + 3 \frac{1}{r^3} = 0$$

or $\frac{d^2}{dx^2} \left(\frac{1}{r} \right) = 0$

or $\frac{d^2}{dx^2} \left(\frac{1}{r} \right) = 0$

$$u = \frac{\sqrt{x^2 + y^2}}{2} \quad \text{etc.}$$

$$\frac{d^2 u}{dx^2} = \frac{d}{dx} \left(\frac{x}{2} \right) = \frac{1}{2}$$

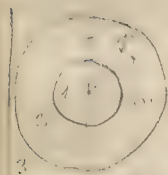
$$u^2 = \frac{x^2 + y^2}{4}$$

$$\frac{d^2 u}{dx^2} = \frac{d}{dx} \left(\frac{x}{2} \right) = \frac{1}{2}$$

$$\frac{d^2 u}{dy^2} = \frac{d}{dy} \left(\frac{y}{2} \right) = \frac{1}{2}$$

$$\frac{d^2 u}{dx^2} + \frac{d^2 u}{dy^2} = \frac{1}{2} + \frac{1}{2} = 1$$

$$\frac{d^2 u}{dx^2} + \frac{d^2 u}{dy^2} = 1$$



$$U_1 = 2\pi p a^2 - 2\pi p b^2 - \frac{4\pi p}{3} \frac{a^3}{r}$$

$$r_0 = 0$$

$$U_1 = 2\pi p a^2 - 2\pi p b^2 - \frac{4\pi p}{3} \frac{a^3}{r}$$

$$r^2 = x^2 + y^2 \quad r^2 = a^2 - b^2$$

$$U_1 = 2\pi p a^2 - \frac{4\pi p}{3} \left[x \cdot a + y \cdot b + \frac{1}{2} r^2 \right]$$

$$\frac{dU_1}{dx} = -\frac{4\pi p}{3} x$$

$$\frac{d^2 U_1}{dx^2} = -\frac{4\pi p}{3}$$

$$\frac{d^2 U_1}{dy^2} = -\frac{4\pi p}{3}$$

$$\frac{d^2 U_1}{dx^2} = -\frac{4\pi p}{3}$$

$$\frac{d^4 U_1}{dx^4} = -4\pi p$$

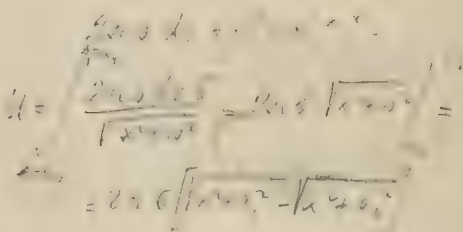
$$f = \frac{1}{2} \left(\frac{d^2 U_1}{dx^2} + \frac{d^2 U_1}{dy^2} \right) = 1$$

$$f = 1$$

Dec 11 1891

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$$y' = 2ab \sqrt{a^2 - x^2} - x$$

20. 11. 1911. 80-1.

4.5 PZ. 4451.1

$$x=0: \frac{d^4 f}{dx^4} = -24 \quad | \quad x=1: \frac{d^4 f}{dx^4} = +24$$

$$\frac{d^2 U}{dx^2} = \frac{d}{dx} \left(\frac{dU}{dx} \right)$$

$$U = \frac{1}{2} k x^2$$

$$\frac{d^2 U}{dx^2} = \frac{d}{dx} \left(\frac{dU}{dx} \right)$$

$$\frac{dU}{dx} = \frac{1}{2} k x$$

$$U = \frac{1}{2} k x^2$$

$$\frac{dU}{dx} = \frac{1}{2} k x$$

$$U = \frac{1}{2} k x^2$$

$$U = \frac{1}{2} k x^2$$

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$$U = \frac{1}{2} k x^2$$

$$U = \frac{1}{2} k x^2$$

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$$S = 1000$$

[Faint handwritten text below the equation]

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$$S = 1100$$

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$$G = \frac{1}{1000}$$

[Faint handwritten text]

$$S = 1000$$

[Faint handwritten text]

$$\frac{q}{2} = 1000$$

$$a = 1000$$

[Faint handwritten text]

$$d = 1000$$

$$H = \sqrt{\frac{1000}{2}}$$

$$H = \frac{1}{2}$$

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$$Poh = 1000 = 1000 + 1000 + 1000$$


$$\frac{1}{2} = \frac{1}{1000} \left| \frac{1}{1000} = \frac{1}{1000} \right| \rightarrow \frac{1}{1000} = \frac{1}{1000} = P$$

Let $\phi_1, \phi_2, \dots, \phi_n$ be a set of functions

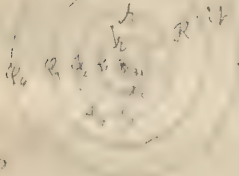
10

$$\phi_1 = \frac{1}{x}, \quad \phi_2 = \frac{1}{x^2}, \quad \dots, \quad \phi_n = \frac{1}{x^n}$$

Consider the functions $\phi_1, \phi_2, \dots, \phi_n$ defined on the interval $(0, \infty)$. The functions are linearly independent. The Wronskian $W(\phi_1, \phi_2, \dots, \phi_n)$ is non-zero for all $x > 0$.

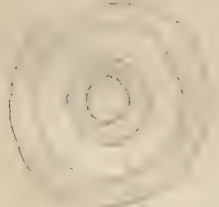


Let $\phi_1, \phi_2, \dots, \phi_n$ be a set of functions. The functions are linearly independent. The Wronskian $W(\phi_1, \phi_2, \dots, \phi_n)$ is non-zero for all $x > 0$.



The functions $\phi_1, \phi_2, \dots, \phi_n$ are linearly independent. The Wronskian $W(\phi_1, \phi_2, \dots, \phi_n)$ is non-zero for all $x > 0$.

Let $\phi_1, \phi_2, \dots, \phi_n$ be a set of functions. The functions are linearly independent. The Wronskian $W(\phi_1, \phi_2, \dots, \phi_n)$ is non-zero for all $x > 0$.



The functions $\phi_1, \phi_2, \dots, \phi_n$ are linearly independent. The Wronskian $W(\phi_1, \phi_2, \dots, \phi_n)$ is non-zero for all $x > 0$.

Q. 1.

$\phi(x) = 0$

$\phi(x) = 0$

$\phi(x) = 0$

$\frac{d}{dx} \phi(x)$

Let $\phi(x) = 0$ then $\phi(x) = 0$

$$\frac{d}{dx} \phi(x) = \frac{d}{dx} 0 = 0$$

$$\phi(x) = 0$$

$$\frac{d}{dx} \phi(x) = \frac{d}{dx} 0 = 0$$

Let $\phi(x) = 0$ then $\phi(x) = 0$

$$Q_2 = 0$$

$$Q_2 = 0$$

$$\frac{d}{dx} \phi(x) = \frac{d}{dx} 0 = 0$$

Let $\phi(x) = 0$

$$\frac{d}{dx} \phi(x) = \frac{d}{dx} 0 = 0$$

$$\frac{d}{dx} \phi(x) = \frac{d}{dx} 0 = 0$$

$$Q_2 = 0$$

Let $\phi(x) = 0$ then $\phi(x) = 0$

$$Q_2 = 0$$

$$Q_2 = 0$$

$$\frac{d}{dx} \phi(x) = \frac{d}{dx} 0 = 0$$

... ..

$$Q_1 = \frac{h_1}{h_1 + h_2} \dots \frac{h_1}{h_1 + h_2}$$

... ..

$$C = \frac{h_1}{h_1 + h_2} = \frac{h_1}{h_1 + h_2}$$



... ..

$$n = \frac{h_1}{h_1 + h_2} = \frac{h_1}{h_1 + h_2}$$

... ..

$$-4n \dots$$

... ..

1911

2.

... ..

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$$0, \quad (x^2 + 1) + (x^2 + 1) = 2(x^2 + 1) = 2x^2 + 2$$

Qu. 11-2

$i_2 = 0, \quad i_1 = 0.5$

$\mathcal{D}' = \{x \in \mathcal{D} : x \neq 0\}$

$$x_1 = -10, G_1 = \frac{1}{2} + i, x_2 = -10, y_2 = 10$$

1. 1. 1.

$$\frac{d_1}{d_2} = \frac{d_3}{d_4} \quad ; \quad \frac{d_1}{d_3} = \frac{d_2}{d_4} \quad ;$$

$$U_2 \left[\frac{1}{x_2} - \frac{1}{x_3} + \frac{1}{x_4} - \frac{1}{x_5} \right] = 0$$

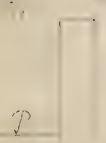
$$Q_2 = \frac{1}{a_1 a_2} + \frac{1}{a_2 a_3} = 1$$

$\frac{Q}{\pi} \left(\frac{\pi}{2} - \alpha \right)$

Rece. 100

52 3 2 42 43

$$\omega_{1/2} = \omega_{1/2} = \omega_{1/2}$$



$$\frac{dI}{dt} = \frac{0}{1} = 0$$

$$-4.25 \cdot \frac{1}{1.25} = -\frac{3.4}{1.25}$$

$$r = \frac{1}{1.25}$$

Orientation



2

X

< 2, 1 >

$$\delta = \frac{P}{m(\beta-1)}$$

... ..

... ..

... ..

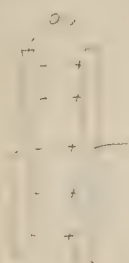
... ..

$$\delta = \frac{P}{m(\beta-1)}$$

$$= \frac{P}{m(\beta-1)}$$

$$= \frac{P}{m(\beta-1)}$$

$P_{11} = 0.1$



1890

2. The ... of ...

1. 2. 3.

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44

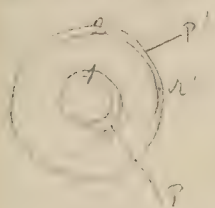
6. 2 1 1 1 1

$$1 - \frac{1}{2} - \frac{1}{2} = 0$$

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2

1. The first part of the paper is devoted to the study of the properties of the function $\varphi(x)$ defined by the equation



$$\frac{Q_1}{\lambda_1} + \frac{Q_2}{\lambda_2} + \frac{\lambda_3}{\lambda_4} \cdot \frac{\lambda_4}{\lambda_5} = 1 \quad \lambda_1 = 0$$

$$\frac{1}{\lambda_1} = \frac{1}{\lambda_1 + \lambda_2} + \frac{1}{\lambda_2} = D'$$

$$\frac{1}{m_1} + \frac{1}{m_2} = \frac{1}{m_3}$$

$$Q_2: \left(\frac{1}{a_1} - \frac{1}{a_2} \right) = 1' 5'$$



(15) $X_5 = X_6$

$\frac{1}{2} \frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = \frac{1}{2} m v \frac{dv}{dt}$
 $= \frac{1}{2} m v \frac{dv}{dt}$
 $= \frac{1}{2} m v \frac{dv}{dt}$

$$\frac{1}{2} m v^2 = \frac{1}{2} m v^2$$

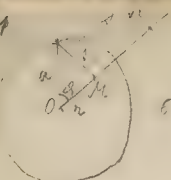
$$\frac{1}{2} m v^2 = \frac{1}{2} m v^2$$

$$H_0 = \frac{1}{2} m v^2 = \frac{1}{2} m v^2$$

$$-4.75 = \frac{1}{2} m v^2 - \frac{1}{2} m v^2$$

$$\frac{1}{2} m v^2 = \frac{1}{2} m v^2$$

$\frac{1}{2} m v^2 = \frac{1}{2} m v^2$
 $\frac{1}{2} m v^2 = \frac{1}{2} m v^2$



0.15

$$\frac{dF}{d\alpha} = \dots$$

$$\int \frac{dF}{\alpha} = u_i = \dots$$

$$F = a^2 + r^2 - 2ar \cos \alpha$$

in limit $\alpha \rightarrow 0$

$$u_i = \int \frac{dF}{1 + \dots + 2ar \cos \alpha}$$

$$= \frac{1}{a} \int \frac{dF}{1 - \frac{2r \cos \alpha}{a} + \frac{r^2}{a^2}}$$

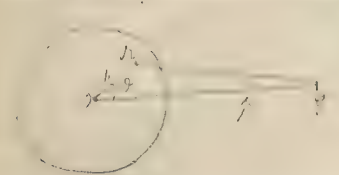
$$\frac{1}{1 - \frac{2r \cos \alpha}{a} + \frac{r^2}{a^2}} = 1 + P_1 \frac{r}{a} + P_2 \frac{r^2}{a^2} + \dots$$

$P_1 = \cos \alpha$, $P_2 = \frac{1}{2} (3 \cos^2 \alpha - 1)$, $P_3 = \frac{1}{4} (5 \cos^3 \alpha - 3 \cos \alpha)$, $P_4 = \frac{1}{8} (35 \cos^4 \alpha - 30 \cos^2 \alpha + 3)$, $P_5 = \frac{1}{16} (63 \cos^5 \alpha - 70 \cos^3 \alpha + 15 \cos \alpha)$, $P_6 = \frac{1}{32} (231 \cos^6 \alpha - 315 \cos^4 \alpha + 105 \cos^2 \alpha - 5)$, $P_7 = \frac{1}{128} (429 \cos^7 \alpha - 693 \cos^5 \alpha + 315 \cos^3 \alpha - 63 \cos \alpha)$, $P_8 = \frac{1}{256} (6435 \cos^8 \alpha - 14620 \cos^6 \alpha + 11550 \cos^4 \alpha - 4200 \cos^2 \alpha + 35)$, $P_9 = \frac{1}{2048} (12285 \cos^9 \alpha - 35280 \cos^7 \alpha + 41580 \cos^5 \alpha - 27720 \cos^3 \alpha + 9240 \cos \alpha)$, $P_{10} = \frac{1}{16384} (17325 \cos^{10} \alpha - 55440 \cos^8 \alpha + 77440 \cos^6 \alpha - 55440 \cos^4 \alpha + 27720 \cos^2 \alpha - 35)$, $P_{11} = \frac{1}{131072} (33069 \cos^{11} \alpha - 120120 \cos^9 \alpha + 208008 \cos^7 \alpha - 230808 \cos^5 \alpha + 154884 \cos^3 \alpha - 55440 \cos \alpha)$, $P_{12} = \frac{1}{1048576} (6435 \cos^{12} \alpha - 25228 \cos^{10} \alpha + 47620 \cos^8 \alpha - 64350 \cos^6 \alpha + 64350 \cos^4 \alpha - 4200 \cos^2 \alpha + 35)$, $P_{13} = \frac{1}{8395008} (12285 \cos^{13} \alpha - 47620 \cos^{11} \alpha + 85980 \cos^9 \alpha - 120120 \cos^7 \alpha + 120120 \cos^5 \alpha - 85980 \cos^3 \alpha + 47620 \cos \alpha)$, $P_{14} = \frac{1}{67187200} (17325 \cos^{14} \alpha - 69300 \cos^{12} \alpha + 120120 \cos^{10} \alpha - 173250 \cos^8 \alpha + 173250 \cos^6 \alpha - 120120 \cos^4 \alpha + 69300 \cos^2 \alpha - 35)$, $P_{15} = \frac{1}{530837760} (33069 \cos^{15} \alpha - 146200 \cos^{13} \alpha + 277200 \cos^{11} \alpha - 420000 \cos^9 \alpha + 554400 \cos^7 \alpha - 643500 \cos^5 \alpha + 554400 \cos^3 \alpha - 420000 \cos \alpha)$, $P_{16} = \frac{1}{4201907200} (6435 \cos^{16} \alpha - 25228 \cos^{14} \alpha + 47620 \cos^{12} \alpha - 64350 \cos^{10} \alpha + 64350 \cos^8 \alpha - 4200 \cos^6 \alpha + 35)$, $P_{17} = \frac{1}{3359001600} (12285 \cos^{17} \alpha - 55440 \cos^{15} \alpha + 105000 \cos^{13} \alpha - 154884 \cos^{11} \alpha + 173250 \cos^9 \alpha - 173250 \cos^7 \alpha + 105000 \cos^5 \alpha - 55440 \cos^3 \alpha + 12285 \cos \alpha)$, $P_{18} = \frac{1}{26871009280} (17325 \cos^{18} \alpha - 77440 \cos^{16} \alpha + 146200 \cos^{14} \alpha - 230808 \cos^{12} \alpha + 277200 \cos^{10} \alpha - 277200 \cos^8 \alpha + 173250 \cos^6 \alpha - 105000 \cos^4 \alpha + 47620 \cos^2 \alpha - 35)$, $P_{19} = \frac{1}{214968038400} (33069 \cos^{19} \alpha - 146200 \cos^{17} \alpha + 277200 \cos^{15} \alpha - 420000 \cos^{13} \alpha + 554400 \cos^{11} \alpha - 643500 \cos^9 \alpha + 643500 \cos^7 \alpha - 420000 \cos^5 \alpha + 277200 \cos^3 \alpha - 12285 \cos \alpha)$, $P_{20} = \frac{1}{1719744307200} (6435 \cos^{20} \alpha - 25228 \cos^{18} \alpha + 47620 \cos^{16} \alpha - 64350 \cos^{14} \alpha + 64350 \cos^{12} \alpha - 4200 \cos^{10} \alpha + 35)$, $P_{21} = \frac{1}{1375795443200} (12285 \cos^{21} \alpha - 55440 \cos^{19} \alpha + 105000 \cos^{17} \alpha - 154884 \cos^{15} \alpha + 173250 \cos^{13} \alpha - 173250 \cos^{11} \alpha + 105000 \cos^9 \alpha - 55440 \cos^7 \alpha + 12285 \cos^5 \alpha - 6435 \cos^3 \alpha + 17325 \cos \alpha)$, $P_{22} = \frac{1}{11006363520000} (17325 \cos^{22} \alpha - 77440 \cos^{20} \alpha + 146200 \cos^{18} \alpha - 230808 \cos^{16} \alpha + 277200 \cos^{14} \alpha - 277200 \cos^{12} \alpha + 173250 \cos^{10} \alpha - 105000 \cos^8 \alpha + 47620 \cos^6 \alpha - 25228 \cos^4 \alpha + 12285 \cos^2 \alpha - 35)$, $P_{23} = \frac{1}{88050908160000} (33069 \cos^{23} \alpha - 146200 \cos^{21} \alpha + 277200 \cos^{19} \alpha - 420000 \cos^{17} \alpha + 554400 \cos^{15} \alpha - 643500 \cos^{13} \alpha + 643500 \cos^{11} \alpha - 420000 \cos^9 \alpha + 277200 \cos^7 \alpha - 12285 \cos^5 \alpha + 17325 \cos^3 \alpha - 17325 \cos \alpha)$, $P_{24} = \frac{1}{704407265280000} (6435 \cos^{24} \alpha - 25228 \cos^{22} \alpha + 47620 \cos^{20} \alpha - 64350 \cos^{18} \alpha + 64350 \cos^{16} \alpha - 4200 \cos^{14} \alpha + 35)$, $P_{25} = \frac{1}{5635258122240000} (12285 \cos^{25} \alpha - 55440 \cos^{23} \alpha + 105000 \cos^{21} \alpha - 154884 \cos^{19} \alpha + 173250 \cos^{17} \alpha - 173250 \cos^{15} \alpha + 105000 \cos^{13} \alpha - 55440 \cos^{11} \alpha + 12285 \cos^9 \alpha - 6435 \cos^7 \alpha + 17325 \cos^5 \alpha - 17325 \cos^3 \alpha + 17325 \cos \alpha)$, $P_{26} = \frac{1}{4508206500000000} (17325 \cos^{26} \alpha - 77440 \cos^{24} \alpha + 146200 \cos^{22} \alpha - 230808 \cos^{20} \alpha + 277200 \cos^{18} \alpha - 277200 \cos^{16} \alpha + 173250 \cos^{14} \alpha - 105000 \cos^{12} \alpha + 47620 \cos^{10} \alpha - 25228 \cos^8 \alpha + 12285 \cos^6 \alpha - 17325 \cos^4 \alpha + 17325 \cos^2 \alpha - 17325 \cos \alpha)$, $P_{27} = \frac{1}{36065652000000000} (33069 \cos^{27} \alpha - 146200 \cos^{25} \alpha + 277200 \cos^{23} \alpha - 420000 \cos^{21} \alpha + 554400 \cos^{19} \alpha - 643500 \cos^{17} \alpha + 643500 \cos^{15} \alpha - 420000 \cos^{13} \alpha + 277200 \cos^{11} \alpha - 12285 \cos^9 \alpha + 17325 \cos^7 \alpha - 17325 \cos^5 \alpha + 17325 \cos^3 \alpha - 17325 \cos \alpha)$, $P_{28} = \frac{1}{288525216000000000} (6435 \cos^{28} \alpha - 25228 \cos^{26} \alpha + 47620 \cos^{24} \alpha - 64350 \cos^{22} \alpha + 64350 \cos^{20} \alpha - 4200 \cos^{18} \alpha + 35)$, $P_{29} = \frac{1}{2308201728000000000} (12285 \cos^{29} \alpha - 55440 \cos^{27} \alpha + 105000 \cos^{25} \alpha - 154884 \cos^{23} \alpha + 173250 \cos^{21} \alpha - 173250 \cos^{19} \alpha + 105000 \cos^{17} \alpha - 55440 \cos^{15} \alpha + 12285 \cos^{13} \alpha - 6435 \cos^{11} \alpha + 17325 \cos^9 \alpha - 17325 \cos^7 \alpha + 17325 \cos^5 \alpha - 17325 \cos^3 \alpha + 17325 \cos \alpha)$, $P_{30} = \frac{1}{18465613824000000000} (17325 \cos^{30} \alpha - 77440 \cos^{28} \alpha + 146200 \cos^{26} \alpha - 230808 \cos^{24} \alpha + 277200 \cos^{22} \alpha - 277200 \cos^{20} \alpha + 173250 \cos^{18} \alpha - 105000 \cos^{16} \alpha + 47620 \cos^{14} \alpha - 25228 \cos^{12} \alpha + 12285 \cos^{10} \alpha - 17325 \cos^8 \alpha + 17325 \cos^6 \alpha - 17325 \cos^4 \alpha + 17325 \cos^2 \alpha - 17325 \cos \alpha)$, $P_{31} = \frac{1}{147724910592000000000} (33069 \cos^{31} \alpha - 146200 \cos^{29} \alpha + 277200 \cos^{27} \alpha - 420000 \cos^{25} \alpha + 554400 \cos^{23} \alpha - 643500 \cos^{21} \alpha + 643500 \cos^{19} \alpha - 420000 \cos^{17} \alpha + 277200 \cos^{15} \alpha - 12285 \cos^{13} \alpha + 17325 \cos^{11} \alpha - 17325 \cos^9 \alpha + 17325 \cos^7 \alpha - 17325 \cos^5 \alpha + 17325 \cos^3 \alpha - 17325 \cos \alpha)$, $P_{32} = \frac{1}{1181800084736000000000} (6435 \cos^{32} \alpha - 25228 \cos^{30} \alpha + 47620 \cos^{28} \alpha - 64350 \cos^{26} \alpha + 64350 \cos^{24} \alpha - 4200 \cos^{22} \alpha + 35)$, $P_{33} = \frac{1}{9454400677888000000000} (12285 \cos^{33} \alpha - 55440 \cos^{31} \alpha + 105000 \cos^{29} \alpha - 154884 \cos^{27} \alpha + 173250 \cos^{25} \alpha - 173250 \cos^{23} \alpha + 105000 \cos^{21} \alpha - 55440 \cos^{19} \alpha + 12285 \cos^{17} \alpha - 6435 \cos^{15} \alpha + 17325 \cos^{13} \alpha - 17325 \cos^{11} \alpha + 17325 \cos^9 \alpha - 17325 \cos^7 \alpha + 17325 \cos^5 \alpha - 17325 \cos^3 \alpha + 17325 \cos \alpha)$, $P_{34} = \frac{1}{75635205423104000000000} (17325 \cos^{34} \alpha - 77440 \cos^{32} \alpha + 146200 \cos^{30} \alpha - 230808 \cos^{28} \alpha + 277200 \cos^{26} \alpha - 277200 \cos^{24} \alpha + 173250 \cos^{22} \alpha - 105000 \cos^{20} \alpha + 47620 \cos^{18} \alpha - 25228 \cos^{16} \alpha + 12285 \cos^{14} \alpha - 17325 \cos^{12} \alpha + 17325 \cos^{10} \alpha - 17325 \cos^8 \alpha + 17325 \cos^6 \alpha - 17325 \cos^4 \alpha + 17325 \cos^2 \alpha - 17325 \cos \alpha)$, $P_{35} = \frac{1}{605081643384832000000000} (33069 \cos^{35} \alpha - 146200 \cos^{33} \alpha + 277200 \cos^{31} \alpha - 420000 \cos^{29} \alpha + 554400 \cos^{27} \alpha - 643500 \cos^{25} \alpha + 643500 \cos^{23} \alpha - 420000 \cos^{21} \alpha + 277200 \cos^{19} \alpha - 12285 \cos^{17} \alpha + 17325 \cos^{15} \alpha - 17325 \cos^{13} \alpha + 17325 \cos^{11} \alpha - 17325 \cos^9 \alpha + 17325 \cos^7 \alpha - 17325 \cos^5 \alpha + 17325 \cos^3 \alpha - 17325 \cos \alpha)$, $P_{36} = \frac{1}{4840653147078656000000000} (6435 \cos^{36} \alpha - 25228 \cos^{34} \alpha + 47620 \cos^{32} \alpha - 64350 \cos^{30} \alpha + 64350 \cos^{28} \alpha - 4200 \cos^{26} \alpha + 35)$, $P_{37} = \frac{1}{38725225176629248000000000} (12285 \cos^{37} \alpha - 55440 \cos^{35} \alpha + 105000 \cos^{33} \alpha - 154884 \cos^{31} \alpha + 173250 \cos^{29} \alpha - 173250 \cos^{27} \alpha + 105000 \cos^{25} \alpha - 55440 \cos^{23} \alpha + 12285 \cos^{21} \alpha - 6435 \cos^{19} \alpha + 17325 \cos^{17} \alpha - 17325 \cos^{15} \alpha + 17325 \cos^{13} \alpha - 17325 \cos^{11} \alpha + 17325 \cos^9 \alpha - 17325 \cos^7 \alpha + 17325 \cos^5 \alpha - 17325 \cos^3 \alpha + 17325 \cos \alpha)$, $P_{38} = \frac{1}{309801801413033984000000000} (17325 \cos^{38} \alpha - 77440 \cos^{36} \alpha + 146200 \cos^{34} \alpha - 230808 \cos^{32} \alpha + 277200 \cos^{30} \alpha - 277200 \cos^{28} \alpha + 173250 \cos^{26} \alpha - 105000 \cos^{24} \alpha + 47620 \cos^{22} \alpha - 25228 \cos^{20} \alpha + 12285 \cos^{18} \alpha - 17325 \cos^{16} \alpha + 17325 \cos^{14} \alpha - 17325 \cos^{12} \alpha + 17325 \cos^{10} \alpha - 17325 \cos^8 \alpha + 17325 \cos^6 \alpha - 17325 \cos^4 \alpha + 17325 \cos^2 \alpha - 17325 \cos \alpha)$, $P_{39} = \frac{1}{2478414411304271872000000000} (33069 \cos^{39} \alpha - 146200 \cos^{37} \alpha + 277200 \cos^{35} \alpha - 420000 \cos^{33} \alpha + 554400 \cos^{31} \alpha - 643500 \cos^{29} \alpha + 643500 \cos^{27} \alpha - 420000 \cos^{25} \alpha + 277200 \cos^{23} \alpha - 12285 \cos^{21} \alpha + 17325 \cos^{19} \alpha - 17325 \cos^{17} \alpha + 17325 \cos^{15} \alpha - 17325 \cos^{13} \alpha + 17325 \cos^{11} \alpha - 17325 \cos^9 \alpha + 17325 \cos^7 \alpha - 17325 \cos^5 \alpha + 17325 \cos^3 \alpha - 17325 \cos \alpha)$, $P_{40} = \frac{1}{19827315290434175360000000000} (6435 \cos^{40} \alpha - 25228 \cos^{38} \alpha + 47620 \cos^{36} \alpha - 64350 \cos^{34} \alpha + 64350 \cos^{32} \alpha - 4200 \cos^{30} \alpha + 35)$, $P_{41} = \frac{1}{158618522323473402880000000000} (12285 \cos^{41} \alpha - 55440 \cos^{39} \alpha + 105000 \cos^{37} \alpha - 154884 \cos^{35} \alpha + 173250 \cos^{33} \alpha - 173250 \cos^{31} \alpha + 105000 \cos^{29} \alpha - 55440 \cos^{27} \alpha + 12285 \cos^{25} \alpha - 6435 \cos^{23} \alpha + 17325 \cos^{21} \alpha - 17325 \cos^{19} \alpha + 17325 \cos^{17} \alpha - 17325 \cos^{15} \alpha + 17325 \cos^{13} \alpha - 17325 \cos^{11} \alpha + 17325 \cos^9 \alpha - 17325 \cos^7 \alpha + 17325 \cos^5 \alpha - 17325 \cos^3 \alpha + 17325 \cos \alpha)$, $P_{42} = \frac{1}{1269028178587787223040000000000} (17325 \cos^{42} \alpha - 77440 \cos^{40} \alpha + 146200 \cos^{38} \alpha - 230808 \cos^{36} \alpha + 277200 \cos^{34} \alpha - 277200 \cos^{32} \alpha + 173250 \cos^{30} \alpha - 105000 \cos^{28} \alpha + 47620 \cos^{26} \alpha - 25228 \cos^{24} \alpha + 12285 \cos^{22} \alpha - 17325 \cos^{20} \alpha + 17325 \cos^{18} \alpha - 17325 \cos^{16} \alpha + 17325 \cos^{14} \alpha - 17325 \cos^{12} \alpha + 17325 \cos^{10} \alpha - 17325 \cos^8 \alpha + 17325 \cos^6 \alpha - 17325 \cos^4 \alpha + 17325 \cos^2 \alpha - 17325 \cos \alpha)$, $P_{43} = \frac{1}{10152225428702297784320000000000} (33069 \cos^{43} \alpha - 146200 \cos^{41} \alpha + 277200 \cos^{39} \alpha - 420000 \cos^{37} \alpha + 554400 \cos^{35} \alpha - 643500 \cos^{33} \alpha + 643500 \cos^{31} \alpha - 420000 \cos^{29} \alpha + 277200 \cos^{27} \alpha - 12285 \cos^{25} \alpha + 17325 \cos^{23} \alpha - 17325 \cos^{21} \alpha + 17325 \cos^{19} \alpha - 17325 \cos^{17} \alpha + 17325 \cos^{15} \alpha - 17325 \cos^{13} \alpha + 17325 \cos^{11} \alpha - 17325 \cos^9 \alpha + 17325 \cos^7 \alpha - 17325 \cos^5 \alpha + 17325 \cos^3 \alpha - 17325 \cos \alpha)$, $P_{44} = \frac{1}{81217803430018382274560000000000} (6435 \cos^{44} \alpha - 25228 \cos^{42} \alpha + 47620 \cos^{40} \alpha - 64350 \cos^{38} \alpha + 64350 \cos^{36} \alpha - 4200 \cos^{34} \alpha + 35)$, $P_{45} = \frac{1}{649742427440147058196480000000000} (12285 \cos^{45} \alpha - 55440 \cos^{43} \alpha + 105000 \cos^{41} \alpha - 154884 \cos^{39} \alpha + 173250 \cos^{37} \alpha - 173250 \cos^{35} \alpha + 105000 \cos^{33} \alpha - 55440 \cos^{31} \alpha + 12285 \cos^{29} \alpha - 6435 \cos^{27} \alpha + 17325 \cos^{25} \alpha - 17325 \cos^{23} \alpha + 17325 \cos^{21} \alpha - 17325 \cos^{19} \alpha + 17325 \cos^{17} \alpha - 17325 \cos^{15} \alpha + 17325 \cos^{13} \alpha - 17325 \cos^{11} \alpha + 17325 \cos^9 \alpha - 17325 \cos^7 \alpha + 17325 \cos^5 \alpha - 17325 \cos^3 \alpha + 17325 \cos \alpha)$, $P_{46} = \frac{1}{5197939419521136465571840000000000} (17325 \cos^{46} \alpha - 77440 \cos^{44} \alpha + 146200 \cos^{42} \alpha - 230808 \cos^{40} \alpha + 277200 \cos^{38} \alpha - 277200 \cos^{36} \alpha + 173250 \cos^{34} \alpha - 105000 \cos^{32} \alpha + 47620 \cos^{30} \alpha - 25228 \cos^{28} \alpha + 12285 \cos^{26} \alpha - 17325 \cos^{24} \alpha + 17325 \cos^{22} \alpha - 17325 \cos^{20} \alpha + 17325 \cos^{18} \alpha - 17325 \cos^{16} \alpha + 17325 \cos^{14} \alpha - 17325 \cos^{12} \alpha + 17325 \cos^{10} \alpha - 17325 \cos^8 \alpha + 17325 \cos^6 \alpha - 17325 \cos^4 \alpha + 17325 \cos^2 \alpha - 17325 \cos \alpha)$, $P_{47} = \frac{1}{41583515356169091724574720000000000} (33069 \cos^{47} \alpha - 146200 \cos^{45} \alpha + 277200 \cos^{43} \alpha - 420000 \cos^{41} \alpha + 554400 \cos^{39} \alpha - 643500 \cos^{37} \alpha + 643500 \cos^{35} \alpha - 420000 \cos^{33} \alpha + 277200 \cos^{31} \alpha - 12285 \cos^{29} \alpha + 17325 \cos^{27} \alpha - 17325 \cos^{25} \alpha + 17325 \cos^{23} \alpha - 17325 \cos^{21} \alpha + 17325 \cos^{19} \alpha - 17325 \cos^{17} \alpha + 17325 \cos^{15} \alpha - 17325 \cos^{13} \alpha + 17325 \cos^{11} \alpha - 17325 \cos^9 \alpha + 17325 \cos^7 \alpha - 17325 \cos^5 \alpha + 17325 \cos^3 \alpha - 17325 \cos \alpha)$, $P_{48} = \frac{1}{332668122849352733796597760000000000} (6435 \cos^{48} \alpha - 25228 \cos^{46} \alpha + 47620 \cos^{44} \alpha - 64350 \cos^{42} \alpha + 64350 \cos^{40} \alpha - 4200 \cos^{38} \alpha + 35)$, $P_{49} = \frac{1}{2661345062794821870372782080000000000} (12285 \cos^{49} \alpha - 55440 \cos^{47} \alpha + 105000 \cos^{45} \alpha - 154884 \cos^{43} \alpha + 173250 \cos^{41} \alpha - 173250 \cos^{39} \alpha + 105000 \cos^{37} \alpha - 55440 \cos^{35} \alpha + 12285 \cos^{33} \alpha - 6435 \cos^{31} \alpha + 17325 \cos^{29} \alpha - 17325 \cos^{27} \alpha + 17325 \cos^{25} \alpha - 17325 \cos^{23} \alpha + 17325 \cos^{21} \alpha - 17325 \cos^{19} \alpha + 17325 \cos^{17} \alpha - 17325 \cos^{15} \alpha + 17325 \cos^{13} \alpha - 17325 \cos^{11} \alpha + 17325 \cos^9 \alpha - 17325 \cos^7 \alpha + 17325 \cos^5 \alpha - 17325 \cos^3 \alpha + 17325 \cos \alpha)$, $P_{50} = \frac{1}{213067605023585749630622572800000000000} (17325 \cos^{50} \alpha - 77440 \cos^{48} \alpha + 146200 \cos^{46} \alpha - 230808 \cos^{44} \alpha + 277200 \cos^{42} \alpha - 277200 \cos^{40} \alpha + 173250 \cos^{38} \alpha - 105000 \cos^{36} \alpha + 47620 \cos^{34} \alpha - 25228 \cos^{32} \alpha + 12285 \cos^{30} \alpha - 17325 \cos^{28} \alpha + 17325 \cos^{26} \alpha - 17325 \cos^{24} \alpha + 17325 \cos^{22} \alpha - 17325 \cos^{20} \alpha + 17325 \cos^{18} \alpha - 17325 \cos^{16} \alpha + 17325 \cos^{14} \alpha - 17325 \cos^{12} \alpha + 17325 \cos^{10} \alpha - 17325 \cos^8 \alpha + 17325 \cos^6 \alpha - 17325 \cos^4 \alpha + 17325 \cos^2 \alpha - 17325 \cos \alpha)$, $P_{51} = \frac{1}{1704540840188685997045060582400000000000} (33069 \cos^{51} \alpha - 146200 \cos^{49} \alpha + 277200 \cos^{47} \alpha - 420000 \cos^{45} \alpha + 554400 \cos^{43} \alpha - 643500 \cos^{41} \alpha + 643500 \cos^{39} \alpha - 420000 \cos^{37} \alpha + 277200 \cos^{35} \alpha - 12285 \cos^{33} \alpha + 17325 \cos^{31} \alpha - 17325 \cos^{29} \alpha + 17325 \cos^{27} \alpha - 17325 \cos^{25} \alpha + 17325 \cos^{23} \alpha - 17325 \cos^{21} \alpha + 17325 \cos^{19} \alpha - 17325 \cos^{17} \alpha + 17325 \cos^{15} \alpha - 17325 \cos^{13} \alpha + 17325 \cos^{11} \alpha - 17325 \cos^9 \alpha + 17325 \cos^7 \alpha - 17325 \cos^5 \alpha + 17325 \cos^3 \alpha - 17325 \cos \alpha)$, $P_{52} = \frac{1}{13636326721509487976360484665600000000000} (6435 \cos^{52} \alpha - 25228 \cos^{50} \alpha + 47620 \cos^{48} \alpha - 64350 \cos^{46} \alpha + 64350 \cos^{44} \alpha - 4200 \cos^{42} \alpha + 35)$, $P_{53} = \frac{1}{109090613772075903810883877324800000000000} (12285 \cos^{53} \alpha - 55440 \cos^{51} \alpha + 105000 \cos^{49} \alpha - 154884 \cos^{47} \alpha + 173250 \cos^{45} \alpha - 173250 \cos^{43} \alpha + 105000 \cos^{41} \alpha - 55440 \cos^{39} \alpha + 12285 \cos^{37} \alpha - 6435 \cos^{35} \alpha + 17325 \cos^{33} \alpha - 17325 \cos^{31} \alpha + 17325 \cos^{29} \alpha - 17325 \cos^{27} \alpha + 17325 \cos^{25} \alpha - 17325 \cos^{23} \alpha + 17325 \cos^{21} \alpha - 17325 \cos^{19} \alpha + 17325 \cos^{17} \alpha - 17325 \cos^{15} \alpha + 17325 \cos^{13} \alpha - 17325 \cos^{11} \alpha + 17325 \cos^9 \alpha - 17325 \cos^7 \alpha + 17325 \cos^5 \alpha - 17325 \cos^3 \alpha + 17325 \cos \alpha)$, $P_{54} = \frac{1}{872725070176607230487071018600000000000000} (17325 \cos^{54} \alpha - 77440 \cos^{52} \alpha + 146200 \cos^{50} \alpha - 230808 \cos^{48} \alpha + 277200 \cos^{46} \alpha - 277200 \cos^{44} \alpha + 173250 \cos^{42} \alpha - 105000 \cos^{40} \alpha + 47620 \cos^{38} \alpha - 25228 \cos^{36} \alpha + 12285 \cos^{34} \alpha - 17325 \cos^{32} \alpha + 17325 \cos^{30} \alpha - 17325 \cos^{28} \alpha + 17325 \cos^{26} \alpha - 17325 \cos^{24} \alpha + 17325 \cos^{22} \alpha - 17325 \cos^{20} \alpha + 17325 \cos^{18} \alpha - 17325 \cos^{16} \alpha + 17325 \cos^{14} \alpha - 17325 \cos^{12} \alpha + 17325 \cos^{10} \alpha - 17325 \cos^8 \alpha + 17325 \cos^6 \alpha - 17325 \cos^4 \alpha + 17325 \cos^2 \alpha - 17325 \cos \alpha)$, $P_{55} = \frac{1}{6981800561412857843896568148800000000000000} (33069 \cos^{55} \alpha - 146200 \cos^{53} \alpha + 277200 \cos^{51} \alpha - 420000 \cos^{49} \alpha + 554400 \cos^{47} \alpha - 643500 \cos^{45} \alpha + 643500 \cos^{43} \alpha - 420000 \cos^{41} \alpha + 277200 \cos^{39} \alpha - 12285 \cos^{37} \alpha + 17325 \cos^{35} \alpha - 17325 \cos^{33} \alpha + 17325 \cos^{31} \alpha - 17325 \cos^{29} \alpha + 17325 \cos^{27} \alpha - 17325 \cos^{$

34

$$H_0 = \frac{1}{n} \sum_{i=1}^n \frac{1}{\sigma_i^2} \quad \text{and} \quad \frac{1}{n} \sum_{i=1}^n \frac{1}{\sigma_i^2} = \frac{1}{n} \sum_{i=1}^n \frac{1}{\sigma_i^2}.$$

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$$C = \frac{1}{\lambda} = \frac{1}{\frac{1}{\lambda}} = \lambda$$

$$u_i = c - \frac{c^2}{\sqrt{1 + r^2 - 2pr \cos \theta}}$$

$$-\frac{q}{1+a^2\frac{r^2}{a^2}} = -\frac{q}{1+a^2\frac{r^2}{a^2}}$$

$$= \frac{1}{a} - \frac{1}{a} \sqrt{\frac{1}{a^2} + \frac{1}{a^2} - \frac{1}{a^2} - \frac{1}{a^2}}$$

$$\frac{\partial}{\partial t} = \frac{c}{v} - \frac{c}{v} \left(\frac{v^2}{a^2} + \frac{a^2}{v^2} - 2 \frac{v}{a} \frac{a}{v} \cos \theta \right)$$

$$= \frac{1}{\sqrt{1 + \frac{a^2}{b^2}}} \quad \left| \begin{array}{l} z = a \cdot \sqrt{1 + \frac{a^2}{b^2}} \\ \cos^2 \frac{1}{2} \theta = \frac{1}{1 + \frac{a^2}{b^2}} \end{array} \right.$$

$$-4.26 = \left(\frac{dL_e}{dr} - \frac{d(U_e)}{dr} \right)$$

$$-4\pi\sigma = -\frac{ca}{a^2} + \frac{a \left[\frac{1}{a^2} - \rho \cos^2 \theta \right]}{\left[\frac{1}{a^2} + \rho^2 - 2\rho \cos \theta \right]^{\frac{3}{2}}} + ca -$$

$$= \frac{1}{2} \frac{1}{1 + \frac{1}{2} + \frac{1}{2}} \quad \left| \quad \frac{1}{2} = \frac{1}{2} \right|$$

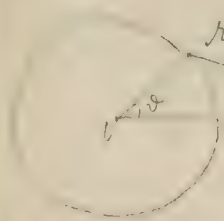
$$-4\pi\epsilon_0 = -\frac{c}{2} + \frac{c}{2} \frac{p^2 - a^2}{(p^2 + a^2)^{3/2}} - \frac{2ap}{(p^2 + a^2)^{3/2}}$$

$$4\pi\epsilon_0 = +\frac{c}{2} + \frac{c}{2} \frac{p^2 - a^2}{(p^2 + a^2)^{3/2}}$$

$$4\pi\epsilon_0 = \frac{c}{2} \left(1 + \frac{p^2 - a^2}{(p^2 + a^2)^{3/2}} \right)$$

$$4\pi\epsilon_0 = -\frac{c}{2} \frac{p^2 - a^2}{(p^2 + a^2)^{3/2}}$$

$$6^2 = \dots$$



$$r = \frac{a}{\sin \theta}$$

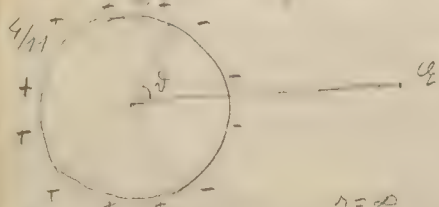
$$r = \frac{a}{\sin \theta}$$

$$r = 2a, \theta = 2\pi/3$$

$$[4\pi\epsilon_0 - \dots]$$

$$r = \frac{a}{\sin \theta}$$

$$r = \frac{a}{\sin \theta}$$



$$u_i = c - \frac{c}{r}$$

$$u_i = \frac{ca}{r} - \frac{ca}{r^2}$$

$$u_i = \frac{ca}{r} - \frac{ca}{r^2}$$

$$u_i = \frac{ca}{r} - \frac{ca}{r^2}$$

$$u_i = \frac{ca}{r} - \frac{ca}{r^2}$$

$$C = \frac{q}{r} \quad \text{for } r = \frac{1}{2} \quad \text{and } \frac{1}{2} \text{ is the radius}$$

$$C = \frac{q}{r}$$

$$4.5 = -\frac{q}{a} \frac{r^2 - a^2}{r \sqrt{r^2}} + \frac{c}{a}$$

$$r = 1.5 + 90^\circ = 1.5 + 1.5708 = 3.0708$$

$$4.5 = 0 = \frac{q}{ra} - \frac{q(r^2 - a^2)}{a \sqrt{r^2}}$$

$$\sqrt{r^2} = r(r^2 - a^2)$$

$$\sqrt{r^2} = \sqrt{r^2 + a^2 - 2ar \cos \theta} = \sqrt{r^2 + a^2 - 2ar \cos \theta}$$

$$r^2 + a^2 - 2ar \cos \theta = \sqrt{r^2 + a^2 - 2ar \cos \theta}$$

$$\sqrt{r^2 + a^2 - 2ar \cos \theta} = \sqrt{r^2 + a^2 - 2ar \cos \theta}$$

$$26. \quad 4a^2 \cos^2 \theta = 5a^2 - \sqrt{3}a^2$$

$$\cos^2 \theta = \frac{5 - \sqrt{3}}{4} = \frac{5 - 1.73}{4} = \frac{3.27}{4} = 0.8175$$

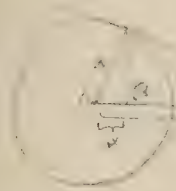
$$\theta = 36.5^\circ \quad \text{and } \theta = 180^\circ - 36.5^\circ = 143.5^\circ$$

$$\theta = 36.5^\circ \quad \text{and } \theta = 180^\circ - 36.5^\circ = 143.5^\circ$$

$$U_e = \frac{q_m}{r_p} - \frac{q_a}{\sqrt{r^2 + a^2 - 2ar \cos \theta}}$$

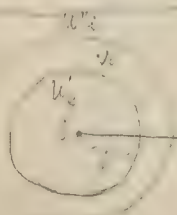
$$= \frac{q_a}{r_p} - \frac{q_a}{\sqrt{r^2 + \frac{a^2}{r^2} - 2 \frac{a}{r} \cos \theta}} \quad \left| \frac{a^2}{r} = x \right.$$

$$= \frac{q_a}{r_p} - \frac{q_a}{\sqrt{r^2 + x - 2a \cos \theta}}$$



in B. in the field of view

we have u_1, u_2 and u_3 in the field of view



$$u_1, u_2, u_3 = \frac{Q}{\sqrt{1 + \frac{Q^2}{4\mu^2}}} = \text{const}$$

$$u_1 = \frac{Q}{a^2} - \frac{Q_1}{a} + \frac{Q_2}{a^2} \quad \frac{1}{a} \left[\frac{Q_1}{a} + \frac{Q_2}{a} + \frac{Q_3}{a} \right]$$

$$u_2 = \frac{1}{2} \left[\frac{Q_1}{a} + \frac{Q_2}{a} + \frac{Q_3}{a} \right]$$

$$\frac{Q}{\sqrt{1 + \frac{Q^2}{4\mu^2}}} = \frac{2(1 - \frac{2}{\mu^2} + \frac{1}{\mu^4})}{\mu} =$$

$$= \frac{Q}{\mu} \left[1 + \frac{P_1}{\mu} + \frac{P_2}{\mu^2} \right]$$

$$\frac{1}{2} \left\{ \frac{Q_1}{a} + \frac{Q_2}{a} + \frac{Q_3}{a} \right\} + \frac{1}{a} \left\{ \frac{Q_1}{a} + \frac{Q_2}{a} + \frac{Q_3}{a} \right\} + \frac{Q}{\mu} \left[1 + \frac{P_1}{\mu} + \frac{P_2}{\mu^2} \right] = C$$

for a, b, c in the field of view

$$U_0' = 1 \quad \dots \quad \dots$$

16

$$\frac{1}{2} U_0' + \frac{1}{r} = C$$

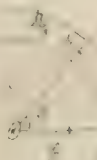
$$\frac{U_0''}{2r} = \dots$$

... ..

... ..

... ..

$$U_0' = \dots$$



$$U_0 - U_0'' = \frac{q}{k} = C$$

... ..

$$U_0' = \frac{1}{r} - \frac{1}{r^2}$$

$$U_0'' = \frac{1}{r^2} + \frac{2}{r^3}$$

$$\frac{q}{k} = \dots$$

$$= \frac{q}{k} [4P_1 + P_2 P_3 + \dots]$$

... ..

... ..

$$\frac{U_0''}{a} = C \quad U_0' + Q = 0 \quad U_0'' = 0 \quad U_0' = 0$$

$$U_0' + \epsilon P_1 = 0$$

$$U_0'' = \dots$$

$$\dots$$

1

$$\frac{2^{\frac{1}{2}}}{f^3} = \frac{2^{\frac{1}{2}}}{f^3}$$

$$4\pi = 4\pi$$

$$f' = \frac{1}{f}$$

$$f$$

$$= -\frac{1}{f^2}$$

$$\frac{1}{f^2}$$

$$1/2 = \dots$$

$$f$$

$$f$$

$$f$$

$$\frac{1}{af} = \frac{1}{f} \text{ at } f = \dots$$

$$2 \dots$$

$$1/af$$

$$f' = a^2$$

$$f' = a - f' = a^2$$

$$a \cdot f' = a^2$$

$$a^2 + af \cdot \dots$$

$$f = f'$$

$$\dots$$

$$\dots$$

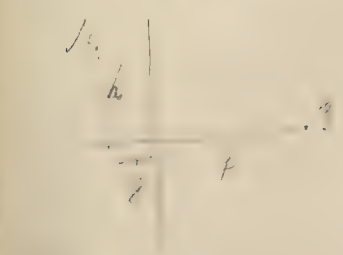
$$\dots$$

$$f' = \dots$$

$$\dots$$

$$\dots$$

$$\dots$$



$$-4h\delta = \frac{dL}{d\delta} - \frac{dL}{d\delta} \bigg|_{\delta=0}$$

$$-\frac{dL}{d\delta} = \frac{2f}{4h^2}$$

$$d_1 + \frac{a}{R} = 0$$

$$d_1 = -\frac{a}{1 + \sqrt{1 + a^2}}$$

$$\frac{dL}{d\delta} = \frac{+4f\delta}{[f^2 + h^2 - \delta^2]^{\frac{3}{2}}}$$

$$\frac{dL}{d\delta} = -\frac{dL}{d\delta}$$

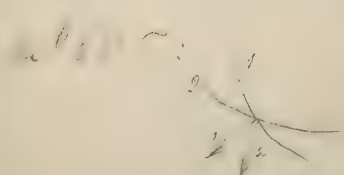
$$U = f \times y^2$$

U = const. ...
 y = ...

Handwritten notes at the top of the page, possibly describing a geometric construction or a physical phenomenon.



Handwritten text on the right side, including the expression $\cos(\theta)$ and other illegible notes.



Handwritten text below the first set of notes on the right side.



Handwritten text on the right side, including the phrase "Laplace's" and other illegible notes.



Handwritten text on the right side, including the phrase "Laplace's" and other illegible notes.

$$\frac{h}{h} = \cos$$

Handwritten text at the bottom left, possibly a date or a reference number.

$$\Sigma = \frac{1}{2} \frac{\partial^2}{\partial t^2}$$

1.



$\frac{1}{2} \frac{\partial^2}{\partial t^2}$

$$\frac{1}{2} \frac{\partial^2}{\partial t^2}$$

$\frac{1}{2} \frac{\partial^2}{\partial t^2}$

$$\frac{1}{2} \frac{\partial^2}{\partial t^2} = \frac{1}{2} \frac{\partial^2}{\partial t^2}$$

$$\frac{1}{2} \frac{\partial^2}{\partial t^2} = \frac{1}{2} \frac{\partial^2}{\partial t^2}$$

$$\frac{1}{2} \frac{\partial^2}{\partial t^2} = \frac{1}{2} \frac{\partial^2}{\partial t^2}$$

$$= \frac{1}{2} \frac{\partial^2}{\partial t^2}$$

$$NL = dF' \cos \theta$$

$$\frac{1}{2} \frac{\partial^2}{\partial t^2} = \frac{1}{2} \frac{\partial^2}{\partial t^2}$$

$$= dF'$$

$$\frac{1}{2} \frac{\partial^2}{\partial t^2} = \frac{1}{2} \frac{\partial^2}{\partial t^2}$$

$$\frac{1}{2} \frac{\partial^2}{\partial t^2} = \frac{1}{2} \frac{\partial^2}{\partial t^2}$$

... ..

... ..

Nov.



Handwritten notes in the top right corner, mostly illegible due to fading.

Handwritten notes in the middle section, including some mathematical expressions and descriptive text.

$$\frac{d}{dt} \int_V \rho \frac{1}{2} v^2 dV = \int_V \rho \frac{d}{dt} \left(\frac{1}{2} v^2 \right) dV = \int_V \rho v \frac{dv}{dt} dV$$

$$= \int_V \rho \left(v \frac{dv}{dt} \right) dV = \int_V \rho \left(v \frac{dv}{dt} \right) dV$$

$$\int_V \rho \frac{d}{dt} \left(\frac{1}{2} v^2 \right) dV = \int_V \rho v \frac{dv}{dt} dV$$

$$= \int_V \rho \left(v \frac{dv}{dt} \right) dV = \int_V \rho \left(v \frac{dv}{dt} \right) dV$$

$$\int_V \rho \left(\frac{1}{2} \frac{d}{dt} v^2 \right) dV = \int_V \rho v \frac{dv}{dt} dV$$

$$= \int_V \rho \left(v \frac{dv}{dt} \right) dV = \int_V \rho \left(v \frac{dv}{dt} \right) dV$$

$$= \int_V \rho \left(\frac{1}{2} \frac{d}{dt} v^2 \right) dV = \int_V \rho v \frac{dv}{dt} dV$$

$$dV = \alpha \pi a^2 dx$$

34

$$= \int_0^1 \int_0^1 \frac{1}{x^2} dx dy = \int_0^1 \left[-\frac{1}{x} \right]_0^1 dy = \int_0^1 (-1) dy = -1$$

$$= \int_0^1 \int_0^1 \frac{1}{x^2} dx dy = \int_0^1 \left[-\frac{1}{x} \right]_0^1 dy = \int_0^1 (-1) dy = -1$$

3. 7. 11 :

$$\int_0^1 \int_0^1 \frac{1}{x^2} dx dy = \int_0^1 \left[-\frac{1}{x} \right]_0^1 dy = \int_0^1 (-1) dy = -1$$

$$\int_0^1 \int_0^1 \frac{1}{x^2} dx dy = \int_0^1 \left[-\frac{1}{x} \right]_0^1 dy = \int_0^1 (-1) dy = -1$$

$$\int_0^1 \int_0^1 \frac{1}{x^2} dx dy = \int_0^1 \left[-\frac{1}{x} \right]_0^1 dy = \int_0^1 (-1) dy = -1$$

$$\int_0^1 \int_0^1 \frac{1}{x^2} dx dy = \int_0^1 \left[-\frac{1}{x} \right]_0^1 dy = \int_0^1 (-1) dy = -1$$

$$- \int_0^1 \int_0^1 \frac{1}{x^2} dx dy = - \int_0^1 \left[-\frac{1}{x} \right]_0^1 dy = - \int_0^1 (-1) dy = 1$$

$$\cos \lambda = \frac{dx}{dn} \quad \sin \lambda = \frac{dy}{dn} \quad \cos^2 \lambda + \sin^2 \lambda = \frac{dx^2}{dn^2} + \frac{dy^2}{dn^2} = 1$$

$$\frac{d^2x}{dn^2} + \frac{d^2y}{dn^2} = \frac{d^2}{dn^2} \left(\frac{dx}{dn} \right)^2 + \frac{d^2}{dn^2} \left(\frac{dy}{dn} \right)^2 = \frac{d^2}{dn^2} \left(\frac{dx^2}{dn^2} + \frac{dy^2}{dn^2} \right) = \frac{d^2}{dn^2} (1) = 0$$

$$\int_0^1 \int_0^1 \frac{d^2x}{dn^2} + \frac{d^2y}{dn^2} dx dy = \int_0^1 \int_0^1 \frac{d^2}{dn^2} \left(\frac{dx^2}{dn^2} + \frac{dy^2}{dn^2} \right) dx dy = \int_0^1 \int_0^1 \frac{d^2}{dn^2} (1) dx dy = \int_0^1 \int_0^1 0 dx dy = 0$$

$$- \int_0^1 \int_0^1 \frac{d^2x}{dn^2} + \frac{d^2y}{dn^2} dx dy = - \int_0^1 \int_0^1 \frac{d^2}{dn^2} \left(\frac{dx^2}{dn^2} + \frac{dy^2}{dn^2} \right) dx dy = - \int_0^1 \int_0^1 \frac{d^2}{dn^2} (1) dx dy = - \int_0^1 \int_0^1 0 dx dy = 0$$

II

$$= \frac{1}{2} \left(\frac{d^2 u}{dx^2} + \frac{d^2 v}{dy^2} \right) = \frac{1}{2} \left(\frac{d^2 u}{dx^2} + \frac{d^2 v}{dy^2} \right)$$

$$-4\pi \int_0^1 \int_0^1 p(x,y) dx dy = 16 \frac{1}{2\pi} \cdot \frac{1}{2} = 4$$

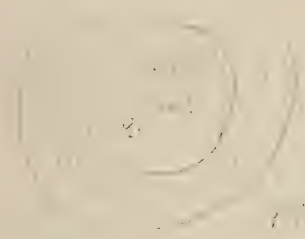
$$0 = \frac{1}{2} \frac{d}{dt} \int_{\mathbb{R}^3} |u|^2 dx = \frac{1}{2} \frac{d}{dt} \int_{\mathbb{R}^3} |u|^2 dx$$

1871

$$\frac{dH}{dt} = \frac{dH}{d\lambda} \cdot \frac{d\lambda}{dt} = 0; \quad \text{mit } \lambda = \lambda(t), \quad \lambda(0) = \lambda_0$$

12/11/11

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III ~

$$x = \frac{1}{2}$$

$$t = 11$$

$$- \dots \int \frac{1}{x} \dots = \int \frac{1}{x} \frac{dU}{dx} dx + \dots \frac{dU}{dx} \frac{dx}{dx} \dots$$

A.
a.
v
c

$$\frac{d}{dx} \frac{1}{2} = \frac{1}{2} \frac{d}{dx}$$

$$\frac{d}{dx} = x - 1$$

$$\frac{d}{dx} = \frac{1}{2} \frac{d}{dx}$$

$$- \dots \frac{d}{dx} = \frac{1}{2} \frac{d}{dx} + \dots \frac{d}{dx} \frac{d}{dx} = \frac{d}{dx} \frac{d}{dx}$$

$$\frac{d}{dx} = \frac{1}{2} \frac{d}{dx} + \dots \frac{d}{dx} \frac{d}{dx} = \frac{d}{dx} \frac{d}{dx}$$

11/1/20

M. H. = M. - U.

$$\int_0^1 \rho \frac{dx}{n} = -\frac{1}{n} \quad \left(\frac{dx}{dt} = -\frac{1}{n} \right) \quad \text{with } x=1 \text{ at } t=0$$

2000

$$f(x) = \frac{1}{x^2} = x^{-2} \quad f'(x) = -2x^{-3} = -\frac{2}{x^3}$$

$$b = \frac{1}{\sqrt{12}}$$

$$c \int \frac{1}{x} = \ln x - \frac{1}{2} \ln 2$$

$$\frac{c \ln \frac{1}{x}}{x} = -\frac{1}{x} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right) = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right)$$

$$\frac{c \ln \frac{1}{x}}{x} = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right) = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right)$$

$$\frac{c \ln \frac{1}{x}}{x} = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right) = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right)$$

$$2n = \frac{1}{x} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right) = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right)$$

$$\frac{c \ln \frac{1}{x}}{x} = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right) = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right)$$

$$c = \frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right) = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right)$$

$$c = \frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right) = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right)$$

$$\frac{c \ln \frac{1}{x}}{x} = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right) = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right)$$

$$\frac{c \ln \frac{1}{x}}{x} = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right) = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right)$$

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$$\frac{c \ln \frac{1}{x}}{x} = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right) = -\frac{1}{4n} \int \frac{1}{x} \frac{d}{dx} \left(\frac{1}{x} \right)$$

I

$$U = U_0 + U_1 + U_2 + \dots$$

$$U_1 = U_0 + U_1 + U_2 + \dots$$

$$U_2 = U_0 + U_1 + U_2 + \dots$$

$$U_3 = U_0 + U_1 + U_2 + \dots$$

$$U_4 = U_0 + U_1 + U_2 + \dots$$

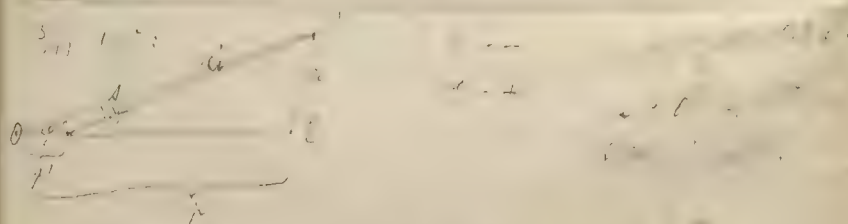
$$U_0' = - \frac{1}{4\pi} \int \frac{\nabla^2 U}{r} dV + U_0'$$

$$U_1 = - \frac{1}{4\pi} \int \frac{\nabla^2 U}{r} dV + U_1'$$

$$U_2 = - \frac{1}{4\pi} \int \frac{\nabla^2 U}{r} dV + U_2'$$

$$U_3 = - \frac{1}{4\pi} \int \frac{\nabla^2 U}{r} dV + U_3'$$

$$U_4 = - \frac{1}{4\pi} \int \frac{\nabla^2 U}{r} dV + U_4'$$



$$U = \frac{q}{r} - \frac{q'}{r'}$$

$$U = \frac{q}{r} - \frac{q'}{r'} + U_1 + U_2 + \dots$$

$$U = \frac{q}{r} - \frac{q'}{r'}$$

$$U_1 = \frac{q}{r} - \frac{q'}{r'}$$

427

12

1. The first group of people who are interested in the study of the history of the United States are the people who are interested in the history of the United States.

5-11-1944

$$\omega^2 = \frac{\omega^2}{1 - \frac{\omega^2}{\phi^2}} = \frac{\phi^2}{\phi^2 - 1} = \phi^2$$

$$2 \frac{1}{2} \text{ } / \text{ } / \text{ }$$

2 .. 6

$$q^2 = \frac{1}{2} \left(\frac{1}{\sqrt{2}} \right)^2 = \frac{1}{4}$$

(Faint handwritten notes)

1881, 1882, 1883

$$\eta = -\frac{1}{42} \frac{z}{u}$$

$$\frac{d}{dt} \left(\frac{1}{R} \right) = - \frac{1}{R^2} \frac{dR}{dt} = - \frac{1}{R^2} \left(- \frac{1}{R} \right) = \frac{1}{R^3}$$

$$= - \frac{d(\ln f)}{ds} + \frac{f'(\ln f)}{f}$$

$$= \frac{-\cos(n-1)\theta}{(n^2-1)^2 + 1} = \frac{\cos(n-1)\theta}{(n^2-1)^2 + 1}$$

$$L = \frac{1}{2} \frac{d^2 x}{dt^2} = \frac{1}{2} \frac{d^2 y}{dt^2}$$

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4/11

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W

$$L = \frac{1}{2} \frac{d^2 x}{dt^2} = \frac{1}{2} \frac{d^2 y}{dt^2}$$

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4/11

$$L = \frac{1}{2} \frac{d^2 x}{dt^2} = \frac{1}{2} \frac{d^2 y}{dt^2}$$

$$\left(\frac{1}{2} \right) \left(\frac{1}{2} \right) \left(\frac{1}{2} \right) \left(\frac{1}{2} \right)$$

$$\left(\frac{1}{2} \right) \left(\frac{1}{2} \right) \left(\frac{1}{2} \right) \left(\frac{1}{2} \right) \left(\frac{1}{2} \right)$$

$$1 \text{ (at } \dots \text{) } \dots$$

$$2 \quad \frac{\frac{1}{2}}{\frac{1}{2}} = 1$$

$$\dots$$

$$\dots$$

$$\dots X \dots$$

$$Y \quad \dots$$

$$\dots$$

$$\dots$$

$$\dots$$

$$\dots$$

$$\dots = \frac{1}{2} \dots$$

$$\frac{1}{2} = \dots$$

$$\dots$$

$$\dots$$

$$\dots$$

$$\dots$$

$$\dots$$

$$\dots$$

$$= 2(1 - \sqrt{1 - \epsilon}) + 2\epsilon$$

$$\frac{d\epsilon}{d\mu} = \dots$$

$$= 2(1 - \sqrt{1 - \epsilon}) - 2\epsilon$$

$$= 2(1 - \sqrt{1 - \epsilon}) - 2\epsilon$$

$$= 2(1 - \sqrt{1 - \epsilon}) - 2\epsilon$$

$$= \frac{2}{\epsilon} \ln \frac{1}{1 - \epsilon}$$

$$U = \frac{2\mu}{1 - \epsilon} \ln \frac{1}{1 - \epsilon} \quad \mu^2 = \frac{1}{1 - \epsilon}$$

$$U = 2 \ln \frac{1}{1 - \epsilon}$$

$$U = \dots$$

$$U = \dots$$

$$U = \dots$$

$$U = \dots$$

$$U = \dots$$

$$\frac{d\epsilon}{d\mu} = -\frac{2\epsilon}{1 - \epsilon}$$

$$p = 2 \ln \frac{1}{1 - \epsilon}$$

$$U = 2 \ln \frac{1}{1 - \epsilon}$$

$$= \frac{2}{1 - \epsilon} \ln \frac{1}{1 - \epsilon}$$

$$U = \frac{2}{1 - \epsilon} \ln \frac{1}{1 - \epsilon}$$

$$C = \frac{2}{1 - \epsilon} \ln \frac{1}{1 - \epsilon}$$

$$d \cdot d' = v \cdot a \cdot i \cdot \rho = 0.1$$

$$C = \frac{2 \cdot 1 \cdot 1 \cdot 1}{1.2}$$

$$C = \frac{2 \cdot 1 \cdot 1 \cdot 1}{1.2}$$

$$\frac{1.2}{1.2} = 1$$

$$1.2 \cdot 1.2 = 1.44$$

$$1.44 \cdot 1.2 = 1.728$$

$$\frac{1}{1.728} = 0.5787$$

$$C = \frac{1.2}{1.728}$$

$$C = \frac{1.2}{1.728}$$

$$C = \frac{1.2}{1.728}$$

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$$C = \frac{1.2}{1.728}$$

$$C = \frac{1.2}{1.728}$$

... ..



$$\frac{b^2}{a^2} = \frac{b^2}{a^2}$$

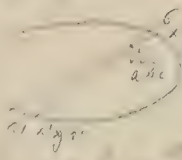
$$b^2 = a^2 \cdot \frac{b^2}{a^2}$$

$$b^2 = a^2 \cdot \frac{b^2}{a^2}$$

$$b^2 = \frac{b^2}{a^2} \cdot a^2$$

... ..

29/11



$F(x, y) = \dots$

$$\frac{\partial F}{\partial x} = \dots$$

$$\cos \alpha = \frac{x-a}{\dots}$$

$$\cos \alpha = \frac{x-a}{\sqrt{(x-a)^2 + (y-b)^2}}$$

$$\sin \alpha = \cos \alpha + \dots$$

$$F: \frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

$$\frac{\partial F}{\partial x} = \frac{2x}{a^2} \quad \frac{\partial F}{\partial y} = \frac{2y}{b^2}$$

$$\frac{\partial F}{\partial z} = \frac{2z}{c^2}$$

$$\cos \varphi = \frac{x - x'}{\sqrt{\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}}} = \frac{\lambda}{a} \cdot \frac{1}{\sqrt{\frac{\lambda^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}}} \quad \left\{ \begin{array}{l} \text{...} \end{array} \right.$$

$$\cos \varphi = \frac{x - x'}{\sqrt{\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}}} \quad \cos \varphi = \frac{27}{\sqrt{27^2 + \frac{y^2}{b^2} + \frac{z^2}{c^2}}}$$

$$\varphi = \arccos \left(\frac{x - x'}{\sqrt{\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}}} \right) \quad \text{...}$$

$$\cos \varphi = \frac{x - x'}{\sqrt{\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}}}$$

$$\cos \varphi = \frac{x - x'}{\sqrt{\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}}}$$

$$\cos \varphi = \frac{x - x'}{\sqrt{\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}}} = \frac{\lambda}{a}$$

$$\cos \varphi = \frac{x - x'}{\sqrt{\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}}} = \frac{\lambda}{a}$$

$$\cos \varphi = \frac{x - x'}{\sqrt{\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}}}$$

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$$\cos \varphi = \frac{x - x'}{\sqrt{\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}}}$$

$$\cos \varphi = \frac{x - x'}{\sqrt{\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}}} = \frac{\lambda}{a}$$

$$\cos \varphi = \frac{x - x'}{\sqrt{\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}}}$$

$$\cos \varphi = \frac{x - x'}{\sqrt{\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}}}$$

$$\cos \varphi = \frac{x - x'}{\sqrt{\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2}}}$$

6-1 p. 100

$$\frac{1}{\sqrt{1-\beta^2}} = \gamma = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$$

$$\frac{1}{\sqrt{1-\beta^2}} = \gamma = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$$

$$\gamma = \frac{1}{\sqrt{1-\beta^2}} = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$$

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$$\frac{1}{\sqrt{1-\beta^2}} = \gamma$$

$$\frac{1}{\sqrt{1-\beta^2}} = \gamma$$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

$$r^2 \left[\frac{\cos^2 \theta}{a^2} + \frac{\sin^2 \theta \cos^2 \phi}{b^2} + \frac{\sin^2 \theta \sin^2 \phi}{c^2} \right] = 1$$

$$\int \frac{r dr}{r^2} = \int \frac{\sin \theta d\theta}{\frac{\cos^2 \theta}{a^2} + \frac{\sin^2 \theta \cos^2 \phi}{b^2} + \frac{\sin^2 \theta \sin^2 \phi}{c^2}}$$

$$H \sim L \sim \frac{1}{\sqrt{2}} \quad b=c$$

$$\frac{1}{\sqrt{2}} = \frac{2}{\sqrt{2}} \int_0^1 \frac{dx}{\sqrt{1-x^2}}$$

$$= \frac{2}{\sqrt{2}} \int_0^1 \frac{dx}{\sqrt{1-x^2}} = \frac{2}{\sqrt{2}} \left[\frac{1}{2} + \frac{1}{2} - \frac{1}{2} \right] = 1$$

$$H \sim L \sim \frac{1}{\sqrt{2}} \quad b=c$$

$$= \frac{2}{\sqrt{2}} \int_0^1 \frac{dx}{\sqrt{1-x^2}} = \frac{2}{\sqrt{2}} \left[\frac{1}{2} + \frac{1}{2} - \frac{1}{2} \right] = 1$$

$$= \frac{4\pi b^2}{\sqrt{2}} \int_0^1 \frac{dx}{\sqrt{1-x^2}}$$

$$= \frac{4\pi b^2}{\sqrt{2}} \int_0^1 \frac{dx}{\sqrt{1-x^2}}$$

$$H = \frac{1}{\sqrt{2}} \frac{4\pi b^2}{\sqrt{2}} \int_0^1 \frac{dx}{\sqrt{1-x^2}} = \frac{4\pi b^2}{2} \int_0^1 \frac{dx}{\sqrt{1-x^2}}$$

$$H = C U$$

$$C = \frac{4\pi b^2}{\sqrt{2}} \int_0^1 \frac{dx}{\sqrt{1-x^2}} \quad \left(\int_0^1 \frac{dx}{\sqrt{1-x^2}} = \frac{\pi}{2} \right) = \frac{4\pi b^2}{\sqrt{2}} \cdot \frac{\pi}{2} = 2\pi^2 b^2$$

$$2\pi^2 b^2 \quad \text{...}$$

$$C = \frac{b}{\pi} \cdot \frac{b}{\pi} = \frac{b^2}{\pi^2} \quad \text{...}$$

21

$$E = \frac{1}{2} \rho v^2$$

$$v = 16$$

$$v = 16$$

$$v = 16$$

$$v = 16$$

$$v = 16$$

$$v = 16$$

$$v = 16$$

$$G' = \frac{G}{\rho v^2} = \frac{G}{\rho v^2}$$

$$G = \frac{1}{2} \rho v^2$$

$$G' = \frac{1}{2} \frac{\rho v^2}{\rho v^2} = \frac{1}{2}$$

$$= \frac{1}{2}$$

$$G' = \frac{1}{2}$$

$$G' = \frac{1}{2}$$

$$G' = \frac{1}{2}$$

$$G' = \frac{1}{2}$$

$$G' = \frac{1}{2}$$

$$G' = \frac{1}{2}$$

$$G' = \frac{1}{2}$$



$$\frac{m_1}{m_2} = \frac{v_1}{v_2}$$

$$\frac{m_1}{m_2} = \frac{v_1}{v_2}$$

$$\frac{m_1}{m_2} = \frac{v_1}{v_2}$$

$$v_1 = \frac{m_2}{m_1} v_2$$

$$\frac{m_1}{m_2} = \frac{v_1}{v_2}$$

$$\frac{m_1}{m_2} = \frac{v_1}{v_2}$$

$$\frac{m_1}{m_2} = \frac{v_1}{v_2}$$

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$$\frac{m_1}{m_2} = \frac{v_1}{v_2}$$

6. ...

...

...

$$x = \frac{1}{a} \ln \frac{1+x}{1-x}$$

$$f = \frac{dx}{x} \quad \dots$$

$$x = \frac{1}{a} \ln \frac{1+x}{1-x}$$

$$\frac{1+x}{1-x} = e^{ax}$$

$$\frac{1+x}{1-x} = e^{ax}$$

Integration auf dem Kreisbogen

$$x = \frac{1}{a} \ln \frac{1+x}{1-x} \quad \dots$$

$$\frac{1}{x} = \frac{1}{\frac{1}{a} \ln \frac{1+x}{1-x}} = \frac{a}{\ln \frac{1+x}{1-x}}$$

...



$$dy dx = dx \frac{dy}{dx}$$

$$y = \frac{1}{x}$$

$$2 R_{\text{prev}}, \text{ Vol. Ods: Vol Ods'}$$

$$h^3 : abc =$$

$$= h ds : p ds'$$

$$6' = 6 \frac{ds}{ds'} = 6 \frac{h^2 p}{abc}$$

$$= \frac{E p}{4 \pi abc} !!!$$

$$\frac{1}{x} = \frac{1}{x}$$

$$= \frac{\sigma' abc}{p \cdot x}$$

$$\sigma h = \frac{\sigma' abc}{p}$$

$$\sigma' = \sigma \frac{p}{abc} = \frac{\sigma \cdot p}{4 \pi abc}$$

25/11

$$2 \sin \theta \cos \theta = 2 \sin \theta \cos \theta =$$

$$- 2 \sin \theta \cos \theta = - \cos 2 \theta$$

$$= \text{BC} \quad \text{c} \text{ takes } \sqrt{x^2 + y^2} \text{ and } \sqrt{x^2 + y^2} \text{ and } \sqrt{x^2 + y^2}$$

$$c = \sqrt{x^2 + y^2}$$

$$- \frac{1}{c} \frac{d}{dt} \sqrt{x^2 + y^2} = - \frac{1}{c} \frac{1}{2} \frac{2x \dot{x} + 2y \dot{y}}{\sqrt{x^2 + y^2}} = - \frac{1}{c} \frac{x \dot{x} + y \dot{y}}{\sqrt{x^2 + y^2}}$$

$$= - \frac{1}{c} \frac{x \dot{x} + y \dot{y}}{\sqrt{x^2 + y^2}} = - \frac{1}{c} \frac{x \dot{x} + y \dot{y}}{c} = - \frac{1}{c^2} (x \dot{x} + y \dot{y})$$

$$= - \frac{1}{c^2} (x \dot{x} + y \dot{y})$$

$$x^2 + y^2 = c^2$$

$$\dot{x}^2 + \dot{y}^2 = 2 \dot{c} \dot{c}$$

$$x^2 + y^2 + z^2 = a^2$$

$$x^2 + y^2 + z^2 = (a+c)^2$$

$$x = \frac{1}{\sqrt{2}} \left(\frac{1}{\sqrt{2}} x' + \frac{1}{\sqrt{2}} y' \right) = \frac{1}{2} (x' + y')$$

$$y = \frac{1}{\sqrt{2}} \left(\frac{1}{\sqrt{2}} x' - \frac{1}{\sqrt{2}} y' \right) = \frac{1}{2} (x' - y')$$

$$z = \frac{1}{\sqrt{2}} \left(\frac{1}{\sqrt{2}} x' + \frac{1}{\sqrt{2}} y' \right) = \frac{1}{2} (x' + y')$$

$$(x' - \frac{1}{\sqrt{2}})^2 + (y' + \frac{1}{\sqrt{2}})^2 + z'^2 = \frac{4}{\sqrt{2}}$$

$$(x' - \frac{1}{\sqrt{2}})^2 + (y' + \frac{1}{\sqrt{2}})^2 + z'^2 = \frac{4}{\sqrt{2}}$$

$$x' - \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} \cos \theta \cos \phi$$

$$x - x' + y^2 + z^2 = \frac{1}{2}$$

$$x' = \frac{1}{\sqrt{2}}$$

$$\frac{1}{\sqrt{2}} \left(\frac{1}{\sqrt{2}} x' + \frac{1}{\sqrt{2}} y' \right) = \frac{1}{2} (x' + y')$$

$$y = \frac{1}{\sqrt{2}} \left(\frac{1}{\sqrt{2}} x' - \frac{1}{\sqrt{2}} y' \right) = \frac{1}{2} (x' - y')$$

$$x' = \frac{1}{\sqrt{2}} \cos \theta \cos \phi$$

$$y' = \frac{1}{\sqrt{2}} \cos \theta \sin \phi$$

$$z' = \frac{1}{\sqrt{2}} \sin \theta$$

$$x' = \frac{1}{\sqrt{2}} \cos \theta \cos \phi$$

$$y' = \frac{1}{\sqrt{2}} \cos \theta \sin \phi$$

$$z' = \frac{1}{\sqrt{2}} \sin \theta$$

$$\frac{1}{\sqrt{2}} \left(\frac{1}{\sqrt{2}} x' + \frac{1}{\sqrt{2}} y' \right) = \frac{1}{2} (x' + y')$$

$$r' = \frac{1}{r} = \frac{1}{\frac{1}{r}} = r$$

$$r' = \frac{1}{r} = \frac{1}{\frac{1}{r}} = r$$

$$r' = \frac{1}{r} = \frac{1}{\frac{1}{r}} = r$$

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$$r' = \frac{1}{r} = \frac{1}{\frac{1}{r}} = r$$

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$$r' = \frac{1}{r} = \frac{1}{\frac{1}{r}} = r$$

$$r' = \frac{1}{r} = \frac{1}{\frac{1}{r}} = r$$

$$r' = \frac{1}{r} = \frac{1}{\frac{1}{r}} = r$$

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$$r' = \frac{1}{r} = \frac{1}{\frac{1}{r}} = r$$

uu.

$$x' = \frac{1}{r} = \frac{1}{\frac{1}{r}} = r$$

$$dx' = \frac{1}{r^2} dx - \frac{2x}{r^3} dr$$

$$dy' = \frac{1}{r} dy - \frac{2y}{r^3} dr$$

$$dz' = \frac{1}{r} dz - \frac{2z}{r^3} dr$$

$$dx'^2 + dy'^2 + dz'^2 = ds'^2 = \frac{1}{r^4} ds^2 - \frac{2}{r^5} (x dx + y dy + z dz) + \frac{4}{r^6} (x^2 dx^2 + y^2 dy^2 + z^2 dz^2)$$

$$d' = \frac{1}{r} \frac{dr}{dt} \frac{dt}{d\theta}$$

$$= \frac{1}{r} \frac{dr}{dt} \frac{a^2}{b^2} \frac{1}{\sin^2 \theta}$$

$$= \frac{1}{r} \frac{dr}{dt} \frac{a^2}{b^2} \frac{1}{\sin^2 \theta}$$

$$\frac{d' r}{dt} = \frac{1}{r} \frac{dr}{dt} - \frac{2r}{b^2} \frac{dr}{dt} \frac{1}{\sin^2 \theta}$$

$$= \frac{1}{r} \frac{dr}{dt} \left(1 - \frac{2r^2}{b^2 \sin^2 \theta} \right) = \frac{1}{r} \frac{dr}{dt} \left(1 - \frac{2a^2}{b^2} \frac{1}{\sin^2 \theta} \right)$$

$$\frac{d' r}{dt} = \frac{1}{r} \frac{dr}{dt} \left(1 - \frac{2a^2}{b^2} \frac{1}{\sin^2 \theta} \right)$$

$$\frac{d' r}{dt} = \frac{1}{r} \frac{dr}{dt} \left(1 - \frac{2a^2}{b^2} \frac{1}{\sin^2 \theta} \right)$$

$$\cos \alpha' = \cos \alpha - \frac{a}{b} \sin \alpha$$

$$\cos \alpha'_1 = \cos \alpha_1 - \frac{a}{b} \sin \alpha_1$$

$$\cos' \alpha_1 = \cos \alpha \cos \alpha_1 - \frac{a}{b} \left(\sin \alpha \cos \alpha_1 + \cos \alpha \sin \alpha_1 \right) + \frac{a^2}{b^2} \sin \alpha \sin \alpha_1$$

$$\cos' \alpha_1 = \cos \alpha \cos \alpha_1 - \frac{a}{b} \left(\sin \alpha \cos \alpha_1 + \cos \alpha \sin \alpha_1 \right) + \frac{a^2}{b^2} \sin \alpha \sin \alpha_1$$

$$+ \frac{a^2}{b^2} \sin \alpha \sin \alpha_1$$

$$\cos \theta' = \cos \theta - \frac{a}{b} \sin \theta$$

$$\cos \theta'_1 = \cos \theta_1 - \frac{a}{b} \sin \theta_1$$

$$\cos' \theta_1 = \cos \theta \cos \theta_1 - \frac{a}{b} \left(\sin \theta \cos \theta_1 + \cos \theta \sin \theta_1 \right) + \frac{a^2}{b^2} \sin \theta \sin \theta_1$$

$$\cos' \theta_1 = \cos \theta \cos \theta_1 - \frac{a}{b} \left(\sin \theta \cos \theta_1 + \cos \theta \sin \theta_1 \right) + \frac{a^2}{b^2} \sin \theta \sin \theta_1$$

$$\cos' \theta_1 = \cos \theta \cos \theta_1 - \frac{a}{b} \left(\sin \theta \cos \theta_1 + \cos \theta \sin \theta_1 \right) + \frac{a^2}{b^2} \sin \theta \sin \theta_1$$

$$\cos' \theta_1 = \cos \theta \cos \theta_1 - \frac{a}{b} \left(\sin \theta \cos \theta_1 + \cos \theta \sin \theta_1 \right) + \frac{a^2}{b^2} \sin \theta \sin \theta_1$$

$$\cos' \theta_1 = \cos \theta \cos \theta_1 - \frac{a}{b} \left(\sin \theta \cos \theta_1 + \cos \theta \sin \theta_1 \right) + \frac{a^2}{b^2} \sin \theta \sin \theta_1$$

$$\cos' \theta_1 = \cos \theta \cos \theta_1 - \frac{a}{b} \left(\sin \theta \cos \theta_1 + \cos \theta \sin \theta_1 \right) + \frac{a^2}{b^2} \sin \theta \sin \theta_1$$

White, Thomas

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of
1871

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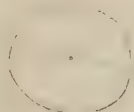
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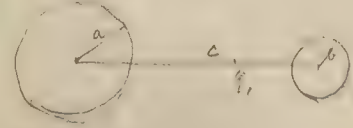
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[illegible]

$$c = \frac{1}{2} \quad \frac{1}{2} = \frac{1}{2}$$

$$c = c - \frac{a^2}{c} \quad \frac{1}{2} = c - \frac{1}{c} = c - \frac{1}{2}$$

$$\frac{1}{2} - \frac{1}{2} = \frac{1}{2} - \frac{1}{2} = \frac{1}{2} \left[\frac{1}{c} - \frac{1}{c - \frac{1}{2}} \right]$$

$$= \frac{1}{2} \left[\frac{1}{c} - \frac{1}{c - \frac{1}{2}} \right] = \frac{1}{2} \left[\frac{1}{c} - \frac{2}{2c - 1} \right]$$

$$q = d - \frac{1}{2} = c - \frac{1}{2} = \left(1 - \frac{1}{2}\right)$$

$$q = \frac{1}{1 - \frac{1}{2}} = \frac{1}{\frac{1}{2}} = 2$$

$$m_1, m_2 = \dots$$

$$H, \dots$$

$$0 < \dots$$

$$\frac{1}{2} \dots$$

$$m_1, m_2 = \dots$$

$$\int_{\gamma_1}^{\gamma_2} \frac{m_1 m_2}{r^2} dr = \dots$$

$$= A$$

$$\frac{m_1 m_2}{r} = A$$

$$A = -\frac{m_1 m_2}{r_1} + \frac{m_1 m_2}{r_2} = \dots$$

$$= \dots$$

$r_2 = 120$

$r_1 = 11$

$r_3 = 15$

re 2.

if $r_1 < r_2$

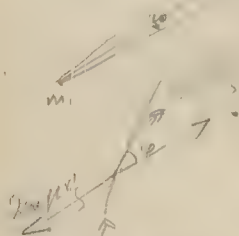
$$\frac{m_1 m_2}{r_1} = 3$$

$$v = \frac{m}{r}$$

-v. 66

2. 0.1.

for r_0 l.



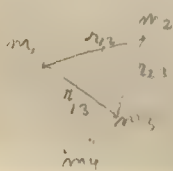
$$\frac{m_1 m_2}{r_1} = \frac{m_1 m_2}{r_2} = 1$$

$$\frac{r_1}{r_2} = d = \frac{d}{r_2} - \frac{m}{r_1} = d$$

$$A = - \int \frac{d}{dr} \left(\frac{m_1 m_2}{r} \right) dr = - \frac{m_1 m_2}{r} = - \frac{m_1 m_2}{r_1} + \frac{m_1 m_2}{r_2}$$

c = P V e h

c = B P V e h



$$\frac{m_1 m_2}{r_1}$$

$$\frac{m_1 m_3}{r_1} + \frac{m_1 m_2}{r_2}$$

$$\frac{m_1 m_4}{r_1} = \frac{m_1 m_2}{r_2}$$

$m_1 = 100$
 $m_2 = 10$
 $m_3 = 10$
 $m_4 = 10$
etc.

$$A = \frac{q}{\epsilon}$$

$$A = \frac{q}{\epsilon}$$

I. $\frac{1}{2} \log \dots$

...
 ...
 ...
 ...

$\frac{2}{12}$

$$\frac{q}{0} \dots \frac{q}{A} \text{ } ^\circ \text{C}$$

$$\mu \overline{AC} = a^2$$

$$I. \dots$$

I. Let $f(x) = \frac{1}{x^2} = x^{-2}$. Then $f'(x) = -2x^{-3} = -\frac{2}{x^3}$.
 Let $g(x) = \frac{1}{x^3} = x^{-3}$. Then $g'(x) = -3x^{-4} = -\frac{3}{x^4}$.
 Let $h(x) = \frac{1}{x^4} = x^{-4}$. Then $h'(x) = -4x^{-5} = -\frac{4}{x^5}$.
 Let $k(x) = \frac{1}{x^5} = x^{-5}$. Then $k'(x) = -5x^{-6} = -\frac{5}{x^6}$.
 Let $l(x) = \frac{1}{x^6} = x^{-6}$. Then $l'(x) = -6x^{-7} = -\frac{6}{x^7}$.
 Let $m(x) = \frac{1}{x^7} = x^{-7}$. Then $m'(x) = -7x^{-8} = -\frac{7}{x^8}$.
 Let $n(x) = \frac{1}{x^8} = x^{-8}$. Then $n'(x) = -8x^{-9} = -\frac{8}{x^9}$.
 Let $p(x) = \frac{1}{x^9} = x^{-9}$. Then $p'(x) = -9x^{-10} = -\frac{9}{x^{10}}$.
 Let $q(x) = \frac{1}{x^{10}} = x^{-10}$. Then $q'(x) = -10x^{-11} = -\frac{10}{x^{11}}$.
 Let $r(x) = \frac{1}{x^{11}} = x^{-11}$. Then $r'(x) = -11x^{-12} = -\frac{11}{x^{12}}$.
 Let $s(x) = \frac{1}{x^{12}} = x^{-12}$. Then $s'(x) = -12x^{-13} = -\frac{12}{x^{13}}$.
 Let $t(x) = \frac{1}{x^{13}} = x^{-13}$. Then $t'(x) = -13x^{-14} = -\frac{13}{x^{14}}$.
 Let $u(x) = \frac{1}{x^{14}} = x^{-14}$. Then $u'(x) = -14x^{-15} = -\frac{14}{x^{15}}$.
 Let $v(x) = \frac{1}{x^{15}} = x^{-15}$. Then $v'(x) = -15x^{-16} = -\frac{15}{x^{16}}$.
 Let $w(x) = \frac{1}{x^{16}} = x^{-16}$. Then $w'(x) = -16x^{-17} = -\frac{16}{x^{17}}$.
 Let $x(x) = \frac{1}{x^{17}} = x^{-17}$. Then $x'(x) = -17x^{-18} = -\frac{17}{x^{18}}$.
 Let $y(x) = \frac{1}{x^{18}} = x^{-18}$. Then $y'(x) = -18x^{-19} = -\frac{18}{x^{19}}$.
 Let $z(x) = \frac{1}{x^{19}} = x^{-19}$. Then $z'(x) = -19x^{-20} = -\frac{19}{x^{20}}$.
 Let $aa(x) = \frac{1}{x^{20}} = x^{-20}$. Then $aa'(x) = -20x^{-21} = -\frac{20}{x^{21}}$.
 Let $bb(x) = \frac{1}{x^{21}} = x^{-21}$. Then $bb'(x) = -21x^{-22} = -\frac{21}{x^{22}}$.
 Let $cc(x) = \frac{1}{x^{22}} = x^{-22}$. Then $cc'(x) = -22x^{-23} = -\frac{22}{x^{23}}$.
 Let $dd(x) = \frac{1}{x^{23}} = x^{-23}$. Then $dd'(x) = -23x^{-24} = -\frac{23}{x^{24}}$.
 Let $ee(x) = \frac{1}{x^{24}} = x^{-24}$. Then $ee'(x) = -24x^{-25} = -\frac{24}{x^{25}}$.
 Let $ff(x) = \frac{1}{x^{25}} = x^{-25}$. Then $ff'(x) = -25x^{-26} = -\frac{25}{x^{26}}$.
 Let $gg(x) = \frac{1}{x^{26}} = x^{-26}$. Then $gg'(x) = -26x^{-27} = -\frac{26}{x^{27}}$.
 Let $hh(x) = \frac{1}{x^{27}} = x^{-27}$. Then $hh'(x) = -27x^{-28} = -\frac{27}{x^{28}}$.
 Let $ii(x) = \frac{1}{x^{28}} = x^{-28}$. Then $ii'(x) = -28x^{-29} = -\frac{28}{x^{29}}$.
 Let $jj(x) = \frac{1}{x^{29}} = x^{-29}$. Then $jj'(x) = -29x^{-30} = -\frac{29}{x^{30}}$.
 Let $kk(x) = \frac{1}{x^{30}} = x^{-30}$. Then $kk'(x) = -30x^{-31} = -\frac{30}{x^{31}}$.
 Let $ll(x) = \frac{1}{x^{31}} = x^{-31}$. Then $ll'(x) = -31x^{-32} = -\frac{31}{x^{32}}$.
 Let $mm(x) = \frac{1}{x^{32}} = x^{-32}$. Then $mm'(x) = -32x^{-33} = -\frac{32}{x^{33}}$.
 Let $nn(x) = \frac{1}{x^{33}} = x^{-33}$. Then $nn'(x) = -33x^{-34} = -\frac{33}{x^{34}}$.
 Let $oo(x) = \frac{1}{x^{34}} = x^{-34}$. Then $oo'(x) = -34x^{-35} = -\frac{34}{x^{35}}$.
 Let $pp(x) = \frac{1}{x^{35}} = x^{-35}$. Then $pp'(x) = -35x^{-36} = -\frac{35}{x^{36}}$.
 Let $qq(x) = \frac{1}{x^{36}} = x^{-36}$. Then $qq'(x) = -36x^{-37} = -\frac{36}{x^{37}}$.
 Let $rr(x) = \frac{1}{x^{37}} = x^{-37}$. Then $rr'(x) = -37x^{-38} = -\frac{37}{x^{38}}$.
 Let $ss(x) = \frac{1}{x^{38}} = x^{-38}$. Then $ss'(x) = -38x^{-39} = -\frac{38}{x^{39}}$.
 Let $tt(x) = \frac{1}{x^{39}} = x^{-39}$. Then $tt'(x) = -39x^{-40} = -\frac{39}{x^{40}}$.
 Let $uu(x) = \frac{1}{x^{40}} = x^{-40}$. Then $uu'(x) = -40x^{-41} = -\frac{40}{x^{41}}$.
 Let $vv(x) = \frac{1}{x^{41}} = x^{-41}$. Then $vv'(x) = -41x^{-42} = -\frac{41}{x^{42}}$.
 Let $ww(x) = \frac{1}{x^{42}} = x^{-42}$. Then $ww'(x) = -42x^{-43} = -\frac{42}{x^{43}}$.
 Let $xx(x) = \frac{1}{x^{43}} = x^{-43}$. Then $xx'(x) = -43x^{-44} = -\frac{43}{x^{44}}$.
 Let $yy(x) = \frac{1}{x^{44}} = x^{-44}$. Then $yy'(x) = -44x^{-45} = -\frac{44}{x^{45}}$.
 Let $zz(x) = \frac{1}{x^{45}} = x^{-45}$. Then $zz'(x) = -45x^{-46} = -\frac{45}{x^{46}}$.
 Let $aaa(x) = \frac{1}{x^{46}} = x^{-46}$. Then $aaa'(x) = -46x^{-47} = -\frac{46}{x^{47}}$.
 Let $bbb(x) = \frac{1}{x^{47}} = x^{-47}$. Then $bbb'(x) = -47x^{-48} = -\frac{47}{x^{48}}$.
 Let $ccc(x) = \frac{1}{x^{48}} = x^{-48}$. Then $ccc'(x) = -48x^{-49} = -\frac{48}{x^{49}}$.
 Let $ddd(x) = \frac{1}{x^{49}} = x^{-49}$. Then $ddd'(x) = -49x^{-50} = -\frac{49}{x^{50}}$.
 Let $eee(x) = \frac{1}{x^{50}} = x^{-50}$. Then $eee'(x) = -50x^{-51} = -\frac{50}{x^{51}}$.
 Let $fff(x) = \frac{1}{x^{51}} = x^{-51}$. Then $fff'(x) = -51x^{-52} = -\frac{51}{x^{52}}$.
 Let $ggg(x) = \frac{1}{x^{52}} = x^{-52}$. Then $ggg'(x) = -52x^{-53} = -\frac{52}{x^{53}}$.
 Let $hhh(x) = \frac{1}{x^{53}} = x^{-53}$. Then $hhh'(x) = -53x^{-54} = -\frac{53}{x^{54}}$.
 Let $iii(x) = \frac{1}{x^{54}} = x^{-54}$. Then $iii'(x) = -54x^{-55} = -\frac{54}{x^{55}}$.
 Let $jjj(x) = \frac{1}{x^{55}} = x^{-55}$. Then $jjj'(x) = -55x^{-56} = -\frac{55}{x^{56}}$.
 Let $kkk(x) = \frac{1}{x^{56}} = x^{-56}$. Then $kkk'(x) = -56x^{-57} = -\frac{56}{x^{57}}$.
 Let $lll(x) = \frac{1}{x^{57}} = x^{-57}$. Then $lll'(x) = -57x^{-58} = -\frac{57}{x^{58}}$.
 Let $mmm(x) = \frac{1}{x^{58}} = x^{-58}$. Then $mmm'(x) = -58x^{-59} = -\frac{58}{x^{59}}$.
 Let $nnn(x) = \frac{1}{x^{59}} = x^{-59}$. Then $nnn'(x) = -59x^{-60} = -\frac{59}{x^{60}}$.
 Let $ooo(x) = \frac{1}{x^{60}} = x^{-60}$. Then $ooo'(x) = -60x^{-61} = -\frac{60}{x^{61}}$.
 Let $ppp(x) = \frac{1}{x^{61}} = x^{-61}$. Then $ppp'(x) = -61x^{-62} = -\frac{61}{x^{62}}$.
 Let $qqq(x) = \frac{1}{x^{62}} = x^{-62}$. Then $qqq'(x) = -62x^{-63} = -\frac{62}{x^{63}}$.
 Let $rrr(x) = \frac{1}{x^{63}} = x^{-63}$. Then $rrr'(x) = -63x^{-64} = -\frac{63}{x^{64}}$.
 Let $sss(x) = \frac{1}{x^{64}} = x^{-64}$. Then $sss'(x) = -64x^{-65} = -\frac{64}{x^{65}}$.
 Let $ttt(x) = \frac{1}{x^{65}} = x^{-65}$. Then $ttt'(x) = -65x^{-66} = -\frac{65}{x^{66}}$.
 Let $uuu(x) = \frac{1}{x^{66}} = x^{-66}$. Then $uuu'(x) = -66x^{-67} = -\frac{66}{x^{67}}$.
 Let $vvv(x) = \frac{1}{x^{67}} = x^{-67}$. Then $vvv'(x) = -67x^{-68} = -\frac{67}{x^{68}}$.
 Let $www(x) = \frac{1}{x^{68}} = x^{-68}$. Then $www'(x) = -68x^{-69} = -\frac{68}{x^{69}}$.
 Let $xxx(x) = \frac{1}{x^{69}} = x^{-69}$. Then $xxx'(x) = -69x^{-70} = -\frac{69}{x^{70}}$.
 Let $yyy(x) = \frac{1}{x^{70}} = x^{-70}$. Then $yyy'(x) = -70x^{-71} = -\frac{70}{x^{71}}$.
 Let $zzz(x) = \frac{1}{x^{71}} = x^{-71}$. Then $zzz'(x) = -71x^{-72} = -\frac{71}{x^{72}}$.
 Let $aaa(x) = \frac{1}{x^{72}} = x^{-72}$. Then $aaa'(x) = -72x^{-73} = -\frac{72}{x^{73}}$.
 Let $bbb(x) = \frac{1}{x^{73}} = x^{-73}$. Then $bbb'(x) = -73x^{-74} = -\frac{73}{x^{74}}$.
 Let $ccc(x) = \frac{1}{x^{74}} = x^{-74}$. Then $ccc'(x) = -74x^{-75} = -\frac{74}{x^{75}}$.
 Let $ddd(x) = \frac{1}{x^{75}} = x^{-75}$. Then $ddd'(x) = -75x^{-76} = -\frac{75}{x^{76}}$.
 Let $eee(x) = \frac{1}{x^{76}} = x^{-76}$. Then $eee'(x) = -76x^{-77} = -\frac{76}{x^{77}}$.
 Let $fff(x) = \frac{1}{x^{77}} = x^{-77}$. Then $fff'(x) = -77x^{-78} = -\frac{77}{x^{78}}$.
 Let $ggg(x) = \frac{1}{x^{78}} = x^{-78}$. Then $ggg'(x) = -78x^{-79} = -\frac{78}{x^{79}}$.
 Let $hhh(x) = \frac{1}{x^{79}} = x^{-79}$. Then $hhh'(x) = -79x^{-80} = -\frac{79}{x^{80}}$.
 Let $iii(x) = \frac{1}{x^{80}} = x^{-80}$. Then $iii'(x) = -80x^{-81} = -\frac{80}{x^{81}}$.
 Let $jjj(x) = \frac{1}{x^{81}} = x^{-81}$. Then $jjj'(x) = -81x^{-82} = -\frac{81}{x^{82}}$.
 Let $kkk(x) = \frac{1}{x^{82}} = x^{-82}$. Then $kkk'(x) = -82x^{-83} = -\frac{82}{x^{83}}$.
 Let $lll(x) = \frac{1}{x^{83}} = x^{-83}$. Then $lll'(x) = -83x^{-84} = -\frac{83}{x^{84}}$.
 Let $mmm(x) = \frac{1}{x^{84}} = x^{-84}$. Then $mmm'(x) = -84x^{-85} = -\frac{84}{x^{85}}$.
 Let $nnn(x) = \frac{1}{x^{85}} = x^{-85}$. Then $nnn'(x) = -85x^{-86} = -\frac{85}{x^{86}}$.
 Let $ooo(x) = \frac{1}{x^{86}} = x^{-86}$. Then $ooo'(x) = -86x^{-87} = -\frac{86}{x^{87}}$.
 Let $ppp(x) = \frac{1}{x^{87}} = x^{-87}$. Then $ppp'(x) = -87x^{-88} = -\frac{87}{x^{88}}$.
 Let $qqq(x) = \frac{1}{x^{88}} = x^{-88}$. Then $qqq'(x) = -88x^{-89} = -\frac{88}{x^{89}}$.
 Let $rrr(x) = \frac{1}{x^{89}} = x^{-89}$. Then $rrr'(x) = -89x^{-90} = -\frac{89}{x^{90}}$.
 Let $sss(x) = \frac{1}{x^{90}} = x^{-90}$. Then $sss'(x) = -90x^{-91} = -\frac{90}{x^{91}}$.
 Let $ttt(x) = \frac{1}{x^{91}} = x^{-91}$. Then $ttt'(x) = -91x^{-92} = -\frac{91}{x^{92}}$.
 Let $uuu(x) = \frac{1}{x^{92}} = x^{-92}$. Then $uuu'(x) = -92x^{-93} = -\frac{92}{x^{93}}$.
 Let $vvv(x) = \frac{1}{x^{93}} = x^{-93}$. Then $vvv'(x) = -93x^{-94} = -\frac{93}{x^{94}}$.
 Let $www(x) = \frac{1}{x^{94}} = x^{-94}$. Then $www'(x) = -94x^{-95} = -\frac{94}{x^{95}}$.
 Let $xxx(x) = \frac{1}{x^{95}} = x^{-95}$. Then $xxx'(x) = -95x^{-96} = -\frac{95}{x^{96}}$.
 Let $yyy(x) = \frac{1}{x^{96}} = x^{-96}$. Then $yyy'(x) = -96x^{-97} = -\frac{96}{x^{97}}$.
 Let $zzz(x) = \frac{1}{x^{97}} = x^{-97}$. Then $zzz'(x) = -97x^{-98} = -\frac{97}{x^{98}}$.
 Let $aaa(x) = \frac{1}{x^{98}} = x^{-98}$. Then $aaa'(x) = -98x^{-99} = -\frac{98}{x^{99}}$.
 Let $bbb(x) = \frac{1}{x^{99}} = x^{-99}$. Then $bbb'(x) = -99x^{-100} = -\frac{99}{x^{100}}$.
 Let $ccc(x) = \frac{1}{x^{100}} = x^{-100}$. Then $ccc'(x) = -100x^{-101} = -\frac{100}{x^{101}}$.
 Let $ddd(x) = \frac{1}{x^{101}} = x^{-101}$. Then $ddd'(x) = -101x^{-102} = -\frac{101}{x^{102}}$.
 Let $eee(x) = \frac{1}{x^{102}} = x^{-102}$. Then $eee'(x) = -102x^{-103} = -\frac{102}{x^{103}}$.
 Let $fff(x) = \frac{1}{x^{103}} = x^{-103}$. Then $fff'(x) = -103x^{-104} = -\frac{103}{x^{104}}$.
 Let $ggg(x) = \frac{1}{x^{104}} = x^{-104}$. Then $ggg'(x) = -104x^{-105} = -\frac{104}{x^{105}}$.
 Let $hhh(x) = \frac{1}{x^{105}} = x^{-105}$. Then $hhh'(x) = -105x^{-106} = -\frac{105}{x^{106}}$.
 Let $iii(x) = \frac{1}{x^{106}} = x^{-106}$. Then $iii'(x) = -106x^{-107} = -\frac{106}{x^{107}}$.
 Let $jjj(x) = \frac{1}{x^{107}} = x^{-107}$. Then $jjj'(x) = -107x^{-108} = -\frac{107}{x^{108}}$.
 Let $kkk(x) = \frac{1}{x^{108}} = x^{-108}$. Then $kkk'(x) = -108x^{-109} = -\frac{108}{x^{109}}$.
 Let $lll(x) = \frac{1}{x^{109}} = x^{-109}$. Then $lll'(x) = -109x^{-110} = -\frac{109}{x^{110}}$.
 Let $mmm(x) = \frac{1}{x^{110}} = x^{-110}$. Then $mmm'(x) = -110x^{-111} = -\frac{110}{x^{111}}$.
 Let $nnn(x) = \frac{1}{x^{111}} = x^{-111}$. Then $nnn'(x) = -111x^{-112} = -\frac{111}{x^{112}}$.
 Let $ooo(x) = \frac{1}{x^{112}} = x^{-112}$. Then $ooo'(x) = -112x^{-113} = -\frac{112}{x^{113}}$.
 Let $ppp(x) = \frac{1}{x^{113}} = x^{-113}$. Then $ppp'(x) = -113x^{-114} = -\frac{113}{x^{114}}$.
 Let $qqq(x) = \frac{1}{x^{114}} = x^{-114}$. Then $qqq'(x) = -114x^{-115} = -\frac{114}{x^{115}}$.
 Let $rrr(x) = \frac{1}{x^{115}} = x^{-115}$. Then $rrr'(x) = -115x^{-116} = -\frac{115}{x^{116}}$.
 Let $sss(x) = \frac{1}{x^{116}} = x^{-116}$. Then $sss'(x) = -116x^{-117} = -\frac{116}{x^{117}}$.
 Let $ttt(x) = \frac{1}{x^{117}} = x^{-117}$. Then $ttt'(x) = -117x^{-118} = -\frac{117}{x^{118}}$.
 Let $uuu(x) = \frac{1}{x^{118}} = x^{-118}$. Then $uuu'(x) = -118x^{-119} = -\frac{118}{x^{119}}$.
 Let $vvv(x) = \frac{1}{x^{119}} = x^{-119}$. Then $vvv'(x) = -119x^{-120} = -\frac{119}{x^{120}}$.
 Let $www(x) = \frac{1}{x^{120}} = x^{-120}$. Then $www'(x) = -120x^{-121} = -\frac{120}{x^{121}}$.
 Let $xxx(x) = \frac{1}{x^{121}} = x^{-121}$. Then $xxx'(x) = -121x^{-122} = -\frac{121}{x^{122}}$.
 Let $yyy(x) = \frac{1}{x^{122}} = x^{-122}$. Then $yyy'(x) = -122x^{-123} = -\frac{122}{x^{123}}$.
 Let $zzz(x) = \frac{1}{x^{123}} = x^{-123}$. Then $zzz'(x) = -123x^{-124} = -\frac{123}{x^{124}}$.
 Let $aaa(x) = \frac{1}{x^{124}} = x^{-124}$. Then $aaa'(x) = -124x^{-125} = -\frac{124}{x^{125}}$.
 Let $bbb(x) = \frac{1}{x^{125}} = x^{-125}$. Then $bbb'(x) = -125x^{-126} = -\frac{125}{x^{126}}$.
 Let $ccc(x) = \frac{1}{x^{126}} = x^{-126}$. Then $ccc'(x) = -126x^{-127} = -\frac{126}{x^{127}}$.
 Let $ddd(x) = \frac{1}{x^{127}} = x^{-127}$. Then $ddd'(x) = -127x^{-128} = -\frac{127}{x^{128}}$.
 Let $eee(x) = \frac{1}{x^{128}} = x^{-128}$. Then $eee'(x) = -128x^{-129} = -\frac{128}{x^{129}}$.
 Let $fff(x) = \frac{1}{x^{129}} = x^{-129}$. Then $fff'(x) = -129x^{-130} = -\frac{129}{x^{130}}$.
 Let $ggg(x) = \frac{1}{x^{130}} = x^{-130}$. Then $ggg'(x) = -130x^{-131} = -\frac{130}{x^{131}}$.
 Let $hhh(x) = \frac{1}{x^{131}} = x^{-131}$. Then $hhh'(x) = -131x^{-132} = -\frac{131}{x^{132}}$.
 Let $iii(x) = \frac{1}{x^{132}} = x^{-132}$. Then $iii'(x) = -132x^{-133} = -\frac{132}{x^{133}}$.
 Let $jjj(x) = \frac{1}{x^{133}} = x^{-133}$. Then $jjj'(x) = -133x^{-134} = -\frac{133}{x^{134}}$.
 Let $kkk(x) = \frac{1}{x^{134}} = x^{-134}$. Then $kkk'(x) = -134x^{-135} = -\frac{134}{x^{135}}$.
 Let $lll(x) = \frac{1}{x^{135}} = x^{-135}$. Then $lll'(x) = -135x^{-136} = -\frac{135}{x^{136}}$.
 Let $mmm(x) = \frac{1}{x^{136}} = x^{-136}$. Then $mmm'(x) = -136x^{-137} = -\frac{136}{x^{137}}$.
 Let $nnn(x) = \frac{1}{x^{137}} = x^{-137}$. Then $nnn'(x) = -137x^{-138} = -\frac{137}{x^{138}}$.
 Let $ooo(x) = \frac{1}{x^{138}} = x^{-138}$. Then $ooo'(x) = -138x^{-139} = -\frac{138}{x^{139}}$.
 Let $ppp(x) = \frac{1}{x^{139}} = x^{-139}$. Then $ppp'(x) = -139x^{-140} = -\frac{139}{x^{140}}$.
 Let $qqq(x) = \frac{1}{x^{140}} = x^{-140}$. Then $qqq'(x) = -140x^{-141} = -\frac{140}{x^{141}}$.
 Let $rrr(x) = \frac{1}{x^{141}} = x^{-141}$. Then $rrr'(x) = -141x^{-142} = -\frac{141}{x^{142}}$.
 Let $sss(x) = \frac{1}{x^{142}} = x^{-142}$. Then $sss'(x) = -142x^{-143} = -\frac{142}{x^{143}}$.
 Let $ttt(x) = \frac{1}{x^{143}} = x^{-143}$. Then $ttt'(x) = -143x^{-144} = -\frac{143}{x^{144}}$.
 Let $uuu(x) = \frac{1}{x^{144}} = x^{-144}$. Then $uuu'(x) = -144x^{-145} = -\frac{144}{x^{145}}$.
 Let $vvv(x) = \frac{1}{x^{145}} = x^{-145}$. Then $vvv'(x) = -145x^{-146} = -\frac{145}{x^{146}}$.
 Let $www(x) = \frac{1}{x^{146}} = x^{-146}$. Then $www'(x) = -146x^{-147} = -\frac{146}{x^{147}}$.
 Let $xxx(x) = \frac{1}{x^{147}} = x^{-147}$. Then $xxx'(x) = -147x^{-148} = -\frac{147}{x^{148}}$.
 Let $yyy(x) = \frac{1}{x^{148}} = x^{-148}$. Then $yyy'(x) = -148x^{-149} = -\frac{148}{x^{149}}$.
 Let $zzz(x) = \frac{1}{x^{149}} = x^{-149}$. Then $zzz'(x) = -149x^{-150} = -\frac{149}{x^{150}}$.
 Let $aaa(x) = \frac{1}{x^{150}} = x^{-150}$. Then $aaa'(x) = -150x^{-151} = -\frac{150}{x^{151}}$.
 Let $bbb(x) = \frac{1}{x^{151}} = x^{-151}$. Then $bbb'(x) = -151x^{-152} = -\frac{151}{x^{152}}$.
 Let $ccc(x) = \frac{1}{x^{152}} = x^{-152}$. Then $ccc'(x) = -152x^{-153} = -\frac{152}{x^{153}}$.
 Let $ddd(x) = \frac{1}{x^{153}} = x^{-153}$. Then $ddd'(x) = -153x^{-154} = -\frac{153}{x^{154}}$.
 Let $eee(x) = \frac{1}{x^{154}} = x^{-154}$. Then $eee'(x) = -154x^{-155} = -\frac{154}{x^{155}}$.
 Let $fff(x) = \frac{1}{x^{155}} = x^{-155}$. Then $fff'(x) = -155x^{-156} = -\frac{155}{x^{156}}$.
 Let $ggg(x) = \frac{1}{x^{156}} = x^{-156}$. Then $ggg'(x) = -156x^{-157} = -\frac{156}{x^{157}}$.
 Let $hhh(x) = \frac{1}{x^{157}} = x^{-157}$. Then $hhh'(x) = -157x^{-158} = -\frac{157}{x^{158}}$.
 Let $iii(x) = \frac{1}{x^{158}} = x^{-158}$. Then $iii'(x) = -158x^{-159} = -\frac{158}{x^{159}}$.
 Let $jjj(x) = \frac{1}{x^{159}} = x^{-159}$. Then $jjj'(x) = -159x^{-160} = -\frac{159}{x^{160}}$.
 Let $kkk(x) = \frac{1}{x^{160}} = x^{-160}$. Then $kkk'(x) = -160x^{-161} = -\frac{160}{x^{161}}$.
 Let $lll(x) = \frac{1}{x^{161}} = x^{-161}$. Then $lll'(x) = -161x^{-162} = -\frac{161}{x^{162}}$.
 Let $mmm(x) = \frac{1}{x^{162}} = x^{-162}$. Then $mmm'(x) = -162x^{-163} = -\frac{162}{x^{163}}$.
 Let $nnn(x) = \frac{1}{x^{163}} = x^{-163}$. Then $nnn'(x) = -163x^{-164} = -\frac{163}{x^{164}}$.
 Let $ooo(x) = \frac{1}{x^{164}} = x^{-164}$. Then $ooo'(x) = -164x^{-165} = -\frac{164}{x^{165}}$.
 Let $ppp(x) = \frac{1}{x^{165}} = x^{-165}$. Then $ppp'(x) = -165x^{-166} = -\frac{165}{x^{166}}$.
 Let $qqq(x) = \frac{1}{x^{166}} = x^{-166}$. Then $qqq'(x) = -166x^{-167} = -\frac{166}{x^{167}}$.
 Let $rrr(x) = \frac{1}{x^{167}} = x^{-167}$. Then $rrr'(x) = -167x^{-168} = -\frac{167}{x^{168}}$.
 Let $sss(x) = \frac{1}{x^{168}} = x^{-168}$. Then $sss'(x) = -168x^{-169} = -\frac{168}{x^{169}}$.
 Let $ttt(x) = \frac{1}{x^{169}} = x^{-169}$. Then $ttt'(x) = -169x^{-170} = -\frac{169}{x^{170}}$.
 Let $uuu(x) = \frac{1}{x^{170}} = x^{-170}$. Then $uuu'(x) = -170x^{-171} = -\frac{170}{x^{171}}$.
 Let $vvv(x) = \frac{1}{x^{171}} = x^{-171}$. Then $vvv'(x) = -171x^{-172} = -\frac{171}{x^{172}}$.
 Let $www(x) = \frac{1}{x^{172}} = x^{-172}$. Then $www'(x) = -172x^{-173} = -\frac{172}{x^{173}}$.
 Let $xxx(x) = \frac{1}{x^{173}} = x^{-173}$. Then $xxx'(x) = -173x^{-174} = -\frac{173}{x^{174}}$.
 Let $yyy(x) = \frac{1}{x^{174}} = x^{-174}$. Then $yyy'(x) = -174x^{-175} = -\frac{174}{x^{175}}$.
 Let $zzz(x) = \frac{1}{x^{175}} = x^{-175}$. Then $zzz'(x) = -175x^{-176} = -\frac{175}{x^{176}}$.
 Let $aaa(x) = \frac{1}{x^{176}} = x^{-176}$. Then $aaa'(x) = -176x^{-177} = -\frac{176}{x^{177}}$.
 Let $bbb(x) = \frac{1}{x^{177}} = x^{-177}$. Then $bbb'(x) = -177x^{-178} = -\frac{177}{x^{178}}$.
 Let $ccc(x) = \frac{1}{x^{178}} = x^{-178}$. Then $ccc'(x) = -178x^{-179} = -\frac{178}{x^{179}}$.
 Let $ddd(x) = \frac{1}{x^{179}} = x^{-179}$. Then $ddd'(x) = -179x^{-180} = -\frac{179}{x^{180}}$.
 Let $eee(x) = \frac{1}{x^{180}} = x^{-180}$. Then $eee'(x) = -180x^{-181} = -\frac{180}{x^{181}}$.
 Let $fff(x) = \frac{1}{x^{181}} = x^{-181}$. Then $fff'(x) = -181x^{-182} = -\frac{181}{x^{182}}$.
 Let $ggg(x) = \frac{1}{x^{182}} = x^{-182}$. Then $ggg'(x) = -182x^{-183} = -\frac{182}{x^{183}}$.
 Let $hhh(x) = \frac{1}{x^{183}} = x^{-183}$. Then $hhh'(x) = -183x^{-184} = -\frac{183}{x^{184}}$.
 Let $iii(x) = \frac{1}{x^{184}} = x^{-184}$. Then $iii'(x) = -184x^{-185} = -\frac{184}{x^{185}}$.
 Let $jjj(x) = \frac{1}{x^{185}} = x^{-185}$. Then $jjj'(x) = -185x^{-186} = -\frac{185}{x^{186}}$.
 Let $kkk(x) = \frac{1}{x^{186}} = x^{-186}$. Then $kkk'(x) = -186x^{-187} = -\frac{186}{x^{187}}$.
 Let $lll(x) = \frac{1}{x^{187}} = x^{-187}$. Then $lll'(x) = -187x^{-188} = -\frac{187}{x^{188}}$.
 Let $mmm(x) = \frac{1}{x^{188}} = x^{-188}$. Then $mmm'(x) = -188x^{-189}$

1000

$$= \frac{1}{2} \cdot \frac{2}{3} = \frac{1}{3}$$

...

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$$\frac{1}{2} \cdot \frac{2}{3} = \frac{1}{3} \quad \left| \quad \frac{1}{2} \cdot \frac{2}{3} = \frac{1}{3} \right.$$

...

...

...

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[Faint, illegible handwriting in the middle section]

[Faint, illegible handwriting in the lower middle section]

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$\frac{1}{2} + \frac{1}{2} = 1$

JA 10

1875-1876

200. $A = -\frac{1}{2}$ $\frac{1}{x^2} + \frac{1}{x} - \frac{1}{x^2}$

$$A' = A + \bar{A} =$$
$$= \frac{dA}{dt} \cdot \frac{1}{A}$$

$$\frac{d^2}{dt^2}$$

$$K = -\frac{g^2}{r^2}$$

$$\frac{1}{r} = \frac{1}{r_0} - \frac{g^2}{2r_0^3}$$

$$K = -\frac{g^2}{r^2} + \frac{g^2}{r^3}$$

$$= -\frac{g^2}{r^2} + \frac{g^2}{r^3}$$

$$\frac{1}{r} = \frac{1}{r_0} - \frac{g^2}{2r_0^3}$$

$$K = -\frac{g^2}{r^2} - \frac{g^2}{r^3}$$

$$\frac{dA}{dt}$$

$$\frac{dA}{dt} = -\frac{1}{2} \frac{g^2}{r^2} + \frac{1}{2} \frac{g^2}{r^3}$$

$$\frac{dA}{dt}$$

$$A_1 A_2$$

$$A_1 A_2$$

... ..

... ..

... ..

$$Q_2 = - \frac{Q_1}{A_1 A_2} \quad \text{and} \quad Q_1 = - \frac{Q_2 A_1}{A_2 B} \quad \text{etc.}$$

... ..

$$Q_1 = \dots$$

... ..

$$Q_1' = - \frac{Q_2'}{c} \quad \text{etc.}$$

$$Q_1' = - \frac{Q_2' h}{c}$$

$$Q_2' = - \frac{Q_1' h}{c}$$

$$A_1 C = \frac{h^2}{c^2}$$

$$A_2 A_1 = \frac{h^2}{c^2}$$

$$B_1 A_2 = c - \frac{h^2}{c}$$

$$A_1 A_2 = c - \frac{h^2}{c}$$

$$A_1 A_2 = c - \frac{h^2}{c} = c - \frac{h^2}{c - \frac{h^2}{c}}$$

$$A_1 A_2 = c - \frac{h^2}{c - \frac{h^2}{c}}$$

$$Q_1 = - \frac{Q_2 h}{c}$$

$$Q_1' = - \frac{Q_2' h}{c}$$

$$Q_2 = + \frac{Q_1 h}{c} = \frac{h^2}{c}$$

$$Q_2' = \frac{Q_1' h}{c} = \frac{h^2}{c}$$

$$\begin{aligned} \psi &= 1 - \frac{1}{2} \left(\frac{v}{c} \right)^2 + \frac{1}{2} \left(\frac{v}{c} \right)^2 \\ &= 1 + \frac{1}{2} \frac{v^2}{c^2} - \frac{1}{2} \frac{v^2}{c^2} \\ &= 2 \left[1 + \frac{1}{2} \frac{v^2}{c^2} \right] \frac{1}{2} \end{aligned}$$

$$\begin{aligned} Q &= P_a \left[1 + \frac{1}{2} \frac{v^2}{c^2} \right] - P'_a \left[1 + \frac{1}{2} \frac{v^2}{c^2} \right] \\ Q' &= P'_a \left[1 + \frac{1}{2} \frac{v^2}{c^2} \right] - P_a \left[1 + \frac{1}{2} \frac{v^2}{c^2} \right] \end{aligned}$$

Energy:

$$A = \frac{P_a}{c} + \frac{P'_a}{c}$$

$$\begin{aligned} \psi &= \alpha P - \beta P' \\ \psi' &= \alpha' P' - \beta' P \\ \beta \psi + \alpha \psi' &= (\alpha \alpha' + \beta \beta') P \\ \beta &= \frac{\alpha \alpha' + \beta \beta'}{\alpha' - \beta} \\ P' &= \frac{\alpha \psi' + \beta \psi}{\alpha' - \beta} \end{aligned}$$

$$A = \frac{1}{c} \frac{1}{\alpha' - \beta} \left[\psi^2 + \alpha \psi'^2 + 2\beta \psi \psi' \right]$$

$$\begin{aligned} \gamma &= \alpha \left[1 + \frac{a h}{c^2} \right] \\ \beta &= h \left[1 + \frac{a h}{c^2} \right] \quad \mu = \frac{h}{c} \end{aligned}$$

$$1 = ab \left[1 + \frac{1}{2} \right]$$

$$1^2 = ab \frac{ab}{c^2}$$

$$3 - 1^2 = ab \left[1 + \frac{1}{2} \right]$$

$$A = \frac{1}{2ab \left[1 + \frac{1}{2} \right]} \left[\frac{ab}{c^2} \left(1 + \frac{1}{2} \right) - a \left(1 + \frac{1}{2} \right) + \frac{1}{2} \left(1 + \frac{1}{2} \right) - \frac{1}{2} \frac{ab}{c^2} \right]$$

$$= \frac{1}{2} + \frac{1}{2b} + \frac{1}{c \left[1 + \frac{1}{2} \right]}$$

$$+ = \frac{1}{2a} - \frac{1}{2b} + \frac{1}{c} \left[\frac{1}{2} - \frac{ab}{c^2} \right]$$

$$\frac{1}{c} = \frac{1}{2} \left[\frac{1}{2} + \frac{2}{c^2} \right]$$

$$-\frac{1}{c} = \frac{1}{2} \left[\frac{1}{2} + \frac{2}{c^2} \right] \left[\frac{1}{2} - \frac{2}{c^2} \right]$$

$$L = 2B, C = 10a, B = \frac{3}{100}$$

$$L = 2B = 2C = 10a = \frac{1}{100}$$

$$100 = 10a = 10 \times \frac{1}{100} = 1$$

$$100 = 10a = 10 \times \frac{1}{100} = 1$$

1/2 Magneten...

$$\text{mag.} : 7 \text{ Lb} = 10 \text{ Lb} = 10 \text{ Lb}$$

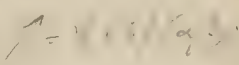
$$10 \text{ Lb} = 10 \text{ Lb} = 10 \text{ Lb}$$

$$10 \text{ Lb} = 10 \text{ Lb} = 10 \text{ Lb}$$

$$10 \text{ Lb} = 10 \text{ Lb} = 10 \text{ Lb}$$

$$10 \text{ Lb} = 10 \text{ Lb} = 10 \text{ Lb}$$

S NS NS 1 6 5 N

$$- \text{in } m' = \mathcal{E}$$


5 — — — — X

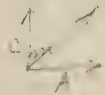
ニ 五ノ一ノニ

Z

$\sum_{i=1}^n x_i = 1$

$\sum_{i=1}^n x_i = 0 \quad \text{if } x_i = 0 \quad \text{if } x_i = 1$

$2 \quad \dots \quad V_i = \dots$



Analysis

Com. Time

m (x) = m (x) = m (x)

m (x) = m (x) = m (x)

$\sum_{i=1}^n x_i = m (x) = m (x)$

$\sum_{i=1}^n x_i = m (x) = m (x)$

$\sum_{i=1}^n x_i = m (x) = m (x)$

$\sum_{i=1}^n x_i = m (x) = m (x)$

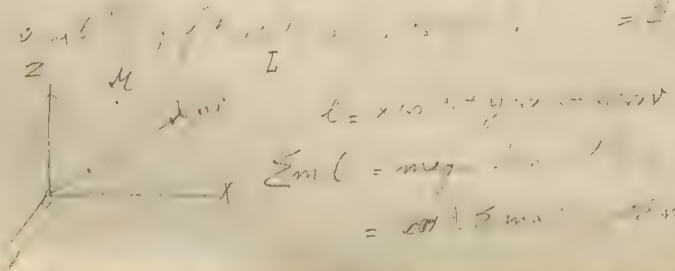
$\sum_{i=1}^n x_i = m (x) = m (x)$

$\sum_{i=1}^n x_i = m (x) = m (x)$

$\sum_{i=1}^n x_i = m (x) = m (x)$

$\sum_{i=1}^n x_i = m (x) = m (x)$

$\sum_{i=1}^n x_i = m (x) = m (x)$



Sum of all the ...

$$\frac{A}{B} = \dots$$

$$\dots$$

$$\dots$$

$$\frac{A}{B} = 1 \quad A = B$$

$$\sum m_i \dots$$

$$\dots$$

$$\dots$$

$$M = \dots$$

$$\dots = 0$$

$$\dots$$

$$M = \dots$$

$$\dots + 5 - \dots$$



$$A = \sum \dots = \sum m_i' \xi_i' - \sum m_i'' \xi_i''$$

$$\xi_1 = \frac{\sum m_i' \xi_i'}{\sum m_i'} \quad \xi_2 = \frac{\sum m_i'' \xi_i''}{\sum m_i''}$$

$$A = \xi_1 \sum m_i' - \xi_2 \sum m_i'' \quad \sum m_i' = \sum m_i''$$

$$A = \sum m_i' (\xi_1 - \xi_2) \sum m_i'$$

$$B = \dots \quad C = \dots$$

$$\frac{1}{1 - \frac{1}{2}} = \frac{2}{2 - 1} = 2$$

the ... of ...

$$\frac{1}{1 - \frac{1}{2}} = \frac{2}{2 - 1} = 2$$

$$C = \sum m_i \quad [1] - [2]$$

$$= m_1 - m_2$$

$$= 2$$

$$m_1 = 1, m_2 = 1$$

$$y \in A \implies y \in B \implies y \in C = A$$

$$1 \in A \implies 1 \in B \implies 1 \in C$$

$$E(x, y) = E(x, y) \implies E(x, y) = E(x, y)$$

$$= E(x, y) - E(x, y)$$

$$= E(x, y) - E(x, y) = 0$$

$$= E(x, y) - E(x, y)$$

$$E(x, y) - E(x, y) = 0$$

$$E(x, y) - E(x, y) = 0$$

$$E(x, y) - E(x, y) = 0$$

$$E(x, y) - E(x, y) = 0$$

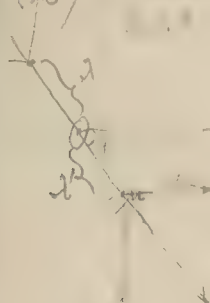
-11/11/11

... = 0.4, f(1) = 0.2

... = 0.2, f(1) = 0.2

... = 0.2, f(1) = 0.2

... = 0.2, f(1) = 0.2



-11/11/11

-11/11/11

-11/11/11

-11/11/11

-11/11/11

$$-11/11/11 + 11/11/11 = 0$$

$$H_{11/11/11} = K_{11/11/11}$$

$$Q_{11/11/11} = Q_{11/11/11}$$

$$T_1 = T_1$$

7/11/11

$$p = i$$

$$p = i$$

$$Q_{11/11/11} = Q_{11/11/11}$$



-11/11/11

$$-11/11/11 + 11/11/11 - 11/11/11 = 0$$

$$-11/11/11 + 11/11/11 - 11/11/11 = 0$$

$$T_1 = \frac{M_{11/11/11}}{11/11/11} = 11/11/11$$

$$T_1 = 11/11/11$$

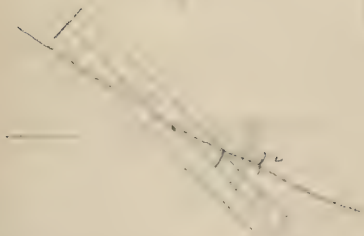
2/1
Mt - road
9-11

V. 2



10
10-100
1000

1000



- 200

- 1000

- 1000

- 1000

1000

2.

$$\cos w \leq 1$$

$A_1 \geq 1$

(1793) 1793

$$W = 0 \quad \text{if } i = 1, \dots, n$$

6. 2. 1.

(Faint handwritten notes at the bottom of the page)

2

$$-uH \cdot \vec{O}_1 \cdot \vec{u}_1 + uH \cdot \vec{O}_2 \cdot \vec{u}_2 = ?$$

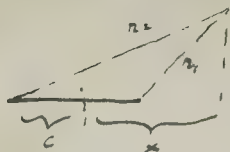
- Mrs. f

$\frac{1}{\rho} = - \dots$
 \dots
 \dots
 \dots

$\tau = \dots$
 \dots
 \dots
 \dots

\dots
 $K \frac{d^2}{dt^2} \dots + \dots = \dots$
 \dots
 \dots
 \dots

\dots
 \dots
 \dots
 $K \frac{d^2}{dt^2} \dots = \dots$



$$U = \mu \int \frac{r_2 + x + c}{r_1 + x - c}$$

$$r_1^2 = (x - c)^2 + y^2$$

$$r_2^2 = (x + c)^2 + y^2$$

$$r_2^2 - r_1^2 = 4cx$$

$$= \mu \int \frac{4cx + r_2^2 - r_1^2 + 4c^2}{4cx + r_2^2 - r_1^2 - 4c^2}$$

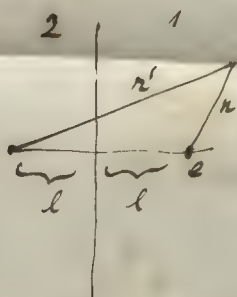
$$= \mu \int \frac{(r_2 + 2c)^2 - r_1^2}{(r_2 - 2c)^2 + r_1^2} = \mu \int \frac{r_1 + r_2 + 2c}{r_1 + r_2 - 2c}$$

$$\frac{r_2 + x + c}{r_1 + x - c}$$

$$\frac{r_1 - x + c}{r_2 + x - c}$$

etc. für Stefan

Punkt elekt. wird nicht abstrahieren!



$$U_1 = \frac{l}{r_2} - \frac{k-1}{k+1} \frac{l}{r_1}$$

$$U_2 = \frac{2}{k+1} \frac{l}{r_2}$$

fürs Vornehmen setzen wir da $r = r'$

$$U_1 = U_2$$

$$\frac{\partial U_1}{\partial x} = k \frac{\partial U_2}{\partial x}$$

was fürorganie punkte in der Formel = $\frac{k-1}{k+1} \frac{l^2}{4l^2}$

urupet. mini

potencia de dipolo. obt. ~~segunda~~ ~~condición~~

$$U = \frac{E}{2\pi\epsilon_0 b^2} \int \frac{r^2 d\theta}{\frac{1}{2} + (\frac{1}{2} - \frac{1}{2}) \cos \theta} = \frac{E}{2\pi\epsilon_0} \int_0^1 \frac{1 + \left(\frac{b^2}{a^2} - 1\right) u^2}{1 + \left(\frac{b^2}{a^2} - 1\right) u^2} du = \frac{E}{2\pi\epsilon_0} \int_0^1 \frac{2u\sqrt{b^2 - a^2}}{a + b - u^2} du$$

$$\int \frac{da}{a^2} = \int \frac{1 da}{1 - a^2} = \frac{1}{2} \ln \frac{1+a}{1-a}$$

$$\int \frac{2a da}{a^2 - 1}$$

$$\frac{a^2 + 1}{a^2 - 1} =$$

$$\frac{1 + a^2}{1 - a^2} \cdot \frac{1 - a^2}{1 + a^2}$$

$$\int \frac{da}{a^2} = \int \frac{da}{1 - a^2}$$

Sección de onda ~~potencia~~ ~~segunda~~

$$C = \frac{1}{2\pi\epsilon_0}$$

$$\text{ant } (x+y) = x+y$$

$$a+ip = \frac{1}{2}(x+iy)$$

$$= \frac{1}{2}x + \frac{1}{2}iy$$

$$1 - \frac{1}{2}x \cdot \frac{1}{2}iy$$

$$C = \frac{\sqrt{a^2 - b^2}}{2\pi\epsilon_0 \sqrt{a^2 + b^2}}$$

$$\frac{2\sqrt{a^2 - b^2}}{2\pi\epsilon_0} = \frac{2}{2\pi\epsilon_0}$$

$$C = \frac{\sqrt{a^2 - b^2}}{\text{ant } \frac{1}{a^2 - 1}} = \frac{i\sqrt{a^2 - b^2}}{\text{ant } i(1 - \frac{b^2}{a^2})}$$

$$\text{ant } ip = x + iy$$

$$ip = \frac{1}{2} \left(\frac{e^{ix} - e^{-ix}}{i} \right) = \frac{1}{2} \left(\frac{e^{ix} - e^{-ix}}{i} \right)$$

$$\varphi = \frac{e^{ix} - e^{-ix}}{2i}$$

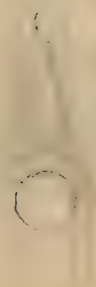
$$2\varphi = \frac{e^{ix} - e^{-ix}}{i}$$

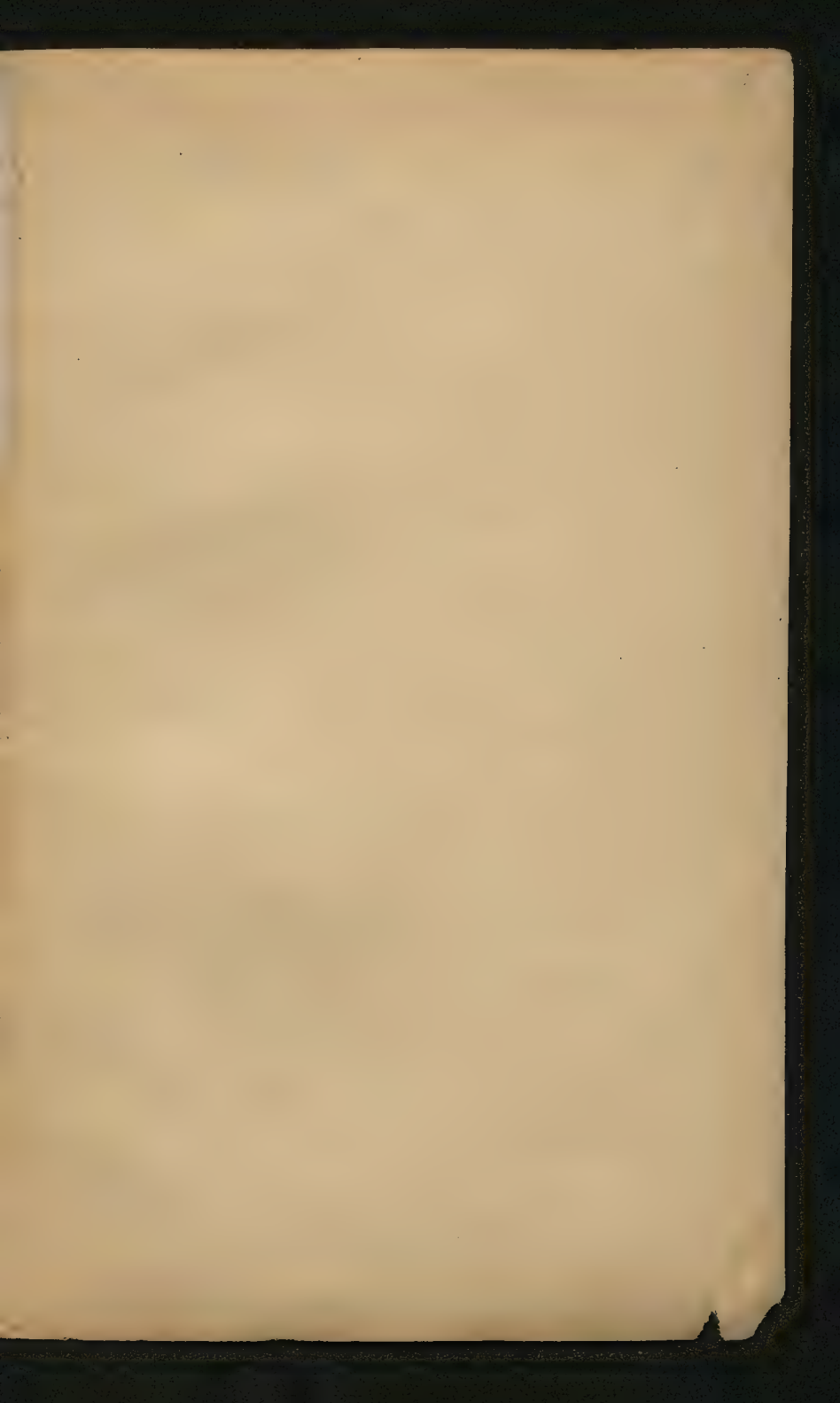
$$e^{2\varphi} = \frac{1 + \varphi}{1 - \varphi}$$

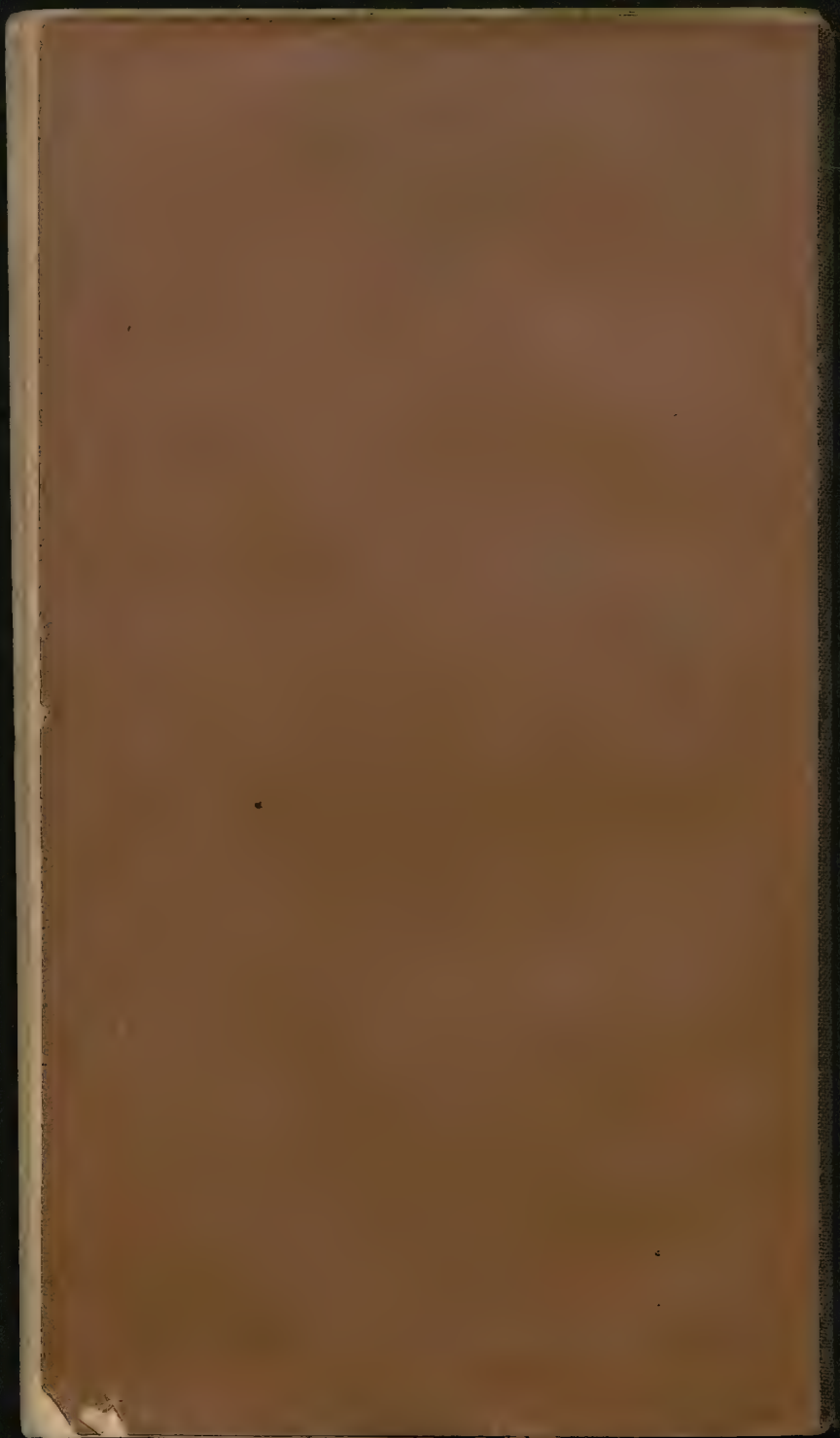
$$x = \frac{1}{2} \ln \frac{1 + \varphi}{1 - \varphi}$$

No.

III







II.

Dr. Josef Stefan

III S. 91/92

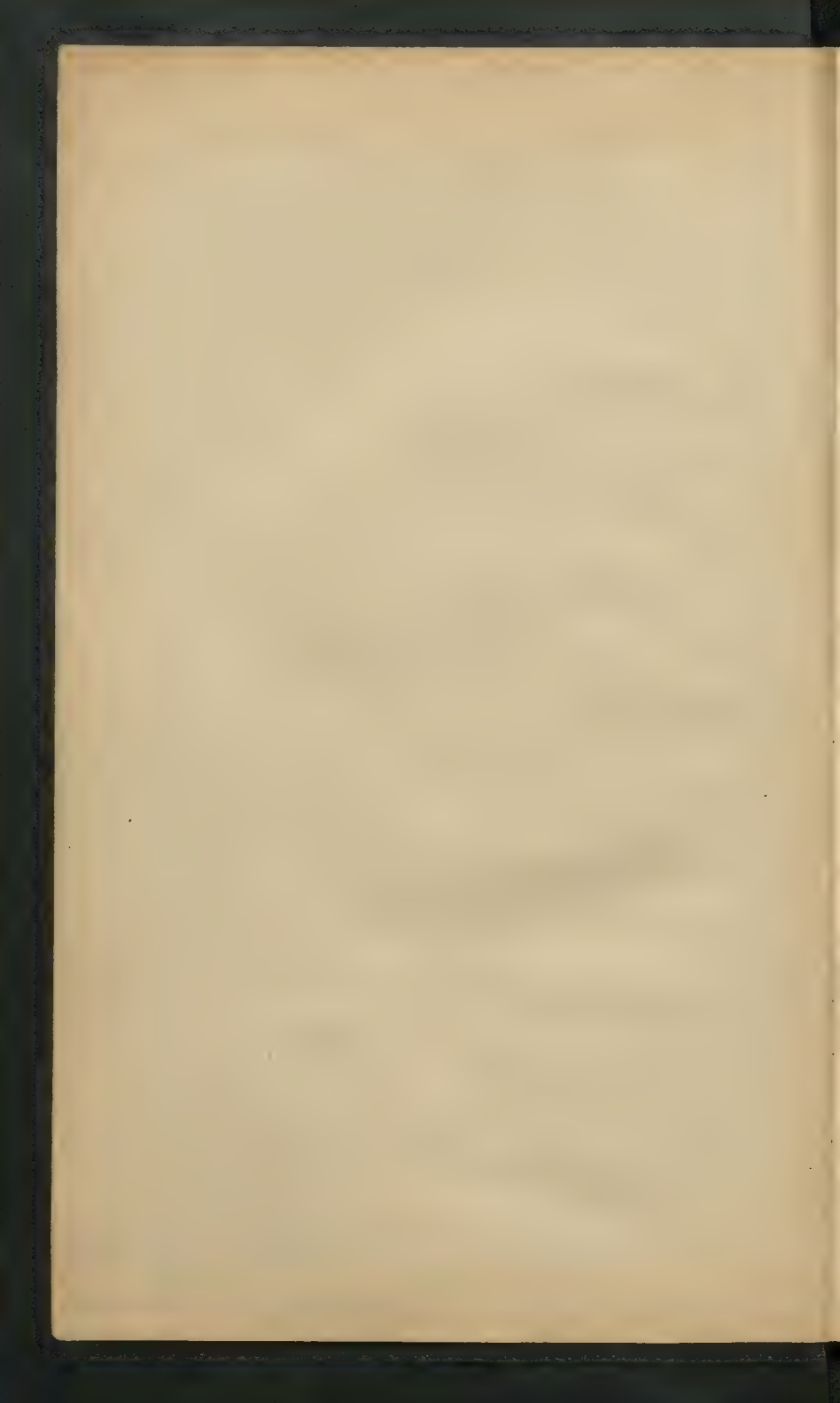
Magnetismus u. Elektricität

M. Moleschowski

6373

J. LUZANSKY
WIEN

IV. Wiedener Hauptstr. 29



$$\frac{d^2 y}{dx^2} - \frac{1}{x} \frac{dy}{dx} + \frac{y}{x^2} = \frac{1}{x^2}$$

$$x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + y = 1$$

$$= -\frac{M R + \frac{1}{2} \rho \cdot \omega^2}{\frac{1}{R}} \cdot \frac{1}{R} + \frac{\frac{1}{2} \rho \cdot \omega^2}{\frac{1}{R}} = \frac{1}{R^2}$$

$$M R + \frac{1}{2} \rho \cdot \omega^2 = a^2 \quad \frac{1}{R} = \frac{1}{a^2}$$

$$y = y_0 + \delta u$$

$$\frac{d^2 y}{dx^2} = \frac{d^2 y_0}{dx^2} + \frac{d^2 \delta u}{dx^2} = \frac{1}{a^2} + \frac{d^2 \delta u}{dx^2}$$

$$- \frac{1}{a^2} y_0 - \frac{1}{a^2} \delta u = \frac{1}{a^2} \quad \frac{d^2 \delta u}{dx^2} = \frac{1}{a^2} + \frac{1}{a^2} y_0 + \frac{1}{a^2} \delta u$$

$$\frac{d^2 \delta u}{dx^2} = \frac{1}{a^2} (1 + y_0 + \delta u)$$

$$\frac{d^2 \delta u}{dx^2} = \frac{1}{a^2} (1 + y_0 + \delta u)$$

$$\frac{d^2 \delta u}{dx^2} - \frac{1}{a^2} \delta u = \frac{1}{a^2} (1 + y_0)$$

$$A e^{\lambda x} \left[\lambda^2 - \frac{1}{a^2} \right] = \frac{1}{a^2} (1 + y_0)$$

$$\lambda^2 - \frac{1}{a^2} = 0$$

$$\lambda = \pm \frac{1}{a}$$

$$\lambda = -\frac{1}{a} \pm \sqrt{\frac{1}{a^2} - \frac{1}{a^2}}$$

$$u = e^{-\frac{1}{a} x} \left[A e^{\frac{1}{a} x} + B e^{-\frac{1}{a} x} \right]$$

$$u = A \cos \omega t + B \sin \omega t$$

$$u = A \cos \omega t + B \sin \omega t$$

$$u = e^{-bt} \left[A \cos \omega t + B \sin \omega t \right]$$

$$u = e^{-bt} \left[A \cos \omega t + B \sin \omega t \right]$$

$$A+B = 0 \quad A-B = 0$$

$$u = e^{-bt} \left[A \cos \omega t + B \sin \omega t \right]$$

$$u = e^{-bt} \left[A \cos \omega t + B \sin \omega t \right]$$

$$\frac{du}{dt} = -B e^{-bt} \left[\omega \cos \omega t + \omega \sin \omega t \right] + e^{-bt} \left[-c B \cos \omega t + c A \sin \omega t \right]$$

$$t=0: u = U_0$$

$$\frac{du}{dt} = 0$$

$$u = U_0 = 0 \quad \frac{du}{dt} = -b U_0 - c U_0$$

$$H = \frac{b U_0}{c} = \frac{b U_0}{c}$$

$$u = U_0 e^{-bt} \left[\cos \omega t - \frac{b}{c} \sin \omega t \right]$$

$$\frac{du}{dt} = e^{-bt} \sin \omega t \left[-b U_0 - c U_0 \right]$$

$$= -e^{-bt} \sin \omega t \frac{b+c}{c} U_0$$

$$= -e^{-bt} \sin \omega t U_0 \frac{a^2}{c}$$

$$t_1: \tau = 0 \quad t = \pi$$

$$t_2: \tau = 0 \quad t = 2\pi$$

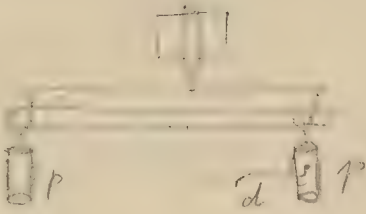
$$\tau = \sqrt{\frac{K}{MH}}$$

$$\tau' = \sqrt{\frac{K+k}{MH}}$$

$$\tau^2 = \frac{K}{MH}$$

$$\tau'^2 = \frac{K+k}{MH}$$

$$\tau'^2 - \tau^2 = \frac{k}{MH}$$



$$\frac{\tau'^2 - \tau^2}{\tau^2} = \frac{k}{K}$$

11. n d. d = 115

$$p d^2 + \frac{1}{2} n^2$$

$$k = 2 p d^2 + p n^2$$

α ... γ ... MH ...

... H'H

$$s \sim \frac{1}{H}$$

$$K \frac{d^2 \varphi}{dt^2} = -HM\varphi + \alpha(f - \varphi) - \beta \frac{d\varphi}{dt}$$

$$\frac{d\varphi}{dt} = 0 \quad \frac{d^2 \varphi}{dt^2} = 0$$

$$0 = -HM\varphi + \alpha(f - \varphi)$$

$$= -(HM + \alpha)\varphi + \alpha f$$

$$\varphi = \frac{\alpha f}{HM + \alpha} = \frac{f}{1 + \frac{HM}{\alpha}}$$

... f = 0 ...

$$s \sim \frac{1}{H}$$

$$d. \quad u_1 = - \frac{H_0}{\omega} e^{-i\omega t_1} \quad \tau = \frac{2\pi}{\omega}$$

$$d. \quad u_2 = - \frac{H_0}{\omega} e^{-i\omega t_2} \quad \text{etc.} \quad \omega t = \omega(t_1 + \tau) = \omega t_1 + 2\pi$$

$$f_1 = \frac{H_0}{2\pi \omega}$$

$$f = \frac{H_0}{2} \quad \dots \quad = \frac{H_0}{2} \left(\frac{1}{\omega} \right) = \frac{H_0}{2\omega}$$

$$d. \quad \Delta \tau_1 = \frac{H_0}{\omega_1} \quad \dots \quad \Delta \tau_2 = \frac{H_0}{\omega_2}$$

$$\begin{aligned} H_0 \quad u_1 &= - H_0 e^{-i\omega t} \\ u_2 &= H_0 e^{-2i\omega t} \\ u_3 &= H_0 e^{-3i\omega t} \\ &\vdots \\ u_{10} &= H_0 e^{-10i\omega t} \end{aligned}$$

H_0

M.P. ...
 ...
 ...

Calculation

$$P = \frac{1}{2} \sum_{m=1}^{\infty} \frac{1}{m^2} \left(1 - \frac{1}{2^m} \right)$$

$$P = \frac{1}{2} \sum_{m=1}^{\infty} \frac{1}{m^2} \left(1 - \frac{1}{2^m} \right)$$

all the terms are positive and the series converges

$$P = \frac{1}{2} \sum_{m=1}^{\infty} \frac{1}{m^2} \left(1 - \frac{1}{2^m} \right)$$

from the above

$$\begin{aligned} P &= \frac{1}{2} \sum_{m=1}^{\infty} \frac{1}{m^2} \left(1 - \frac{1}{2^m} \right) \\ &= \frac{1}{2} \sum_{m=1}^{\infty} \frac{1}{m^2} \left[1 + \frac{1}{2^m} + \frac{1}{2^{2m}} + \dots \right] \\ &= \frac{1}{2} \sum_{m=1}^{\infty} \frac{1}{m^2} \left[1 + \frac{1}{2^m} + \frac{1}{2^{2m}} + \dots \right] \\ &= \frac{1}{2} \sum_{m=1}^{\infty} \frac{1}{m^2} + \frac{1}{2} \sum_{m=1}^{\infty} \frac{1}{m^2 2^m} + \frac{1}{2} \sum_{m=1}^{\infty} \frac{1}{m^2 2^{2m}} + \dots \end{aligned}$$

$$P = \frac{1}{2} \left[\sum_{m=1}^{\infty} \frac{1}{m^2} + \sum_{m=1}^{\infty} \frac{1}{m^2 2^m} + \sum_{m=1}^{\infty} \frac{1}{m^2 2^{2m}} + \dots \right]$$

$$P = \frac{A \left(\frac{1}{2} + \frac{2m + 1}{2} \right)}{K^2}$$

$$A = 1 \quad B = 0 \quad C = 0$$

$$P = \frac{A \cdot 3}{K^2} \left[\frac{1}{2} + \frac{2m + 1}{2} \right]$$

$$= \dots = 1.50$$

$$L^2 = \frac{1}{2} \dots$$

$$X = \dots$$

$$\frac{S}{N} = \dots$$

X

$$= - \frac{1}{2} \dots$$

$$= - \frac{1}{2} - \frac{3}{2} \dots$$

$$= - \frac{1}{2} - \frac{1}{2} \dots$$

$$= \dots$$

$$\text{sol. } L = \dots \quad K = \frac{1}{2}$$

$$Y = - \left[\frac{1}{2} - 3 \frac{1}{2} \right] = + 2 \frac{1}{2}$$

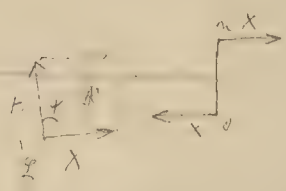
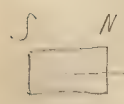
$$= Y = 0$$

$$L = \dots \quad Y_0 = \dots$$

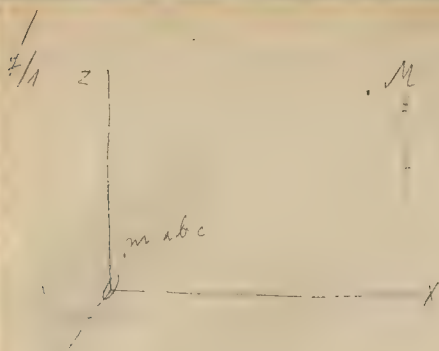
Maximization

... ..

... ..



... ..



Column 1

$$Y = f(x, y, z)$$

$$= f(x, y, z) - \frac{\partial f}{\partial x} a - \frac{\partial f}{\partial y} b - \frac{\partial f}{\partial z} c$$

$$+ \frac{1}{1.2} \left[\frac{\partial^2 f}{\partial x^2} a^2 + \frac{\partial^2 f}{\partial y^2} b^2 + \frac{\partial^2 f}{\partial z^2} c^2 + 2 \frac{\partial^2 f}{\partial x \partial y} ab + \dots \right]$$

$$+ \frac{1}{6} \left[\frac{\partial^3 f}{\partial x^3} a^3 + \frac{\partial^3 f}{\partial y^3} b^3 + \frac{\partial^3 f}{\partial z^3} c^3 + 3 \frac{\partial^3 f}{\partial x^2 \partial y} a^2 b + \dots \right]$$

$$C.V. = \sum \frac{1}{i} =$$

$$- f(x, y, z) - \frac{\partial f}{\partial x} \sum a - \frac{\partial f}{\partial y} \sum b - \frac{\partial f}{\partial z} \sum c +$$

$$M = \sum m a \quad \sum b = 0 \quad \sum c = 0$$

$$P = - M \frac{\partial f}{\partial x}$$

$$= - \frac{M f}{R^2}$$

$$\sum m a^2 = 1 + \dots = 1 - \frac{1}{2} \frac{M}{R^2}$$

$$\sum m b^2 = 0 \quad \sum m c^2 = 0$$

$$P \approx m \frac{1}{2} \frac{M}{R^2} = \dots$$

$$2m^2 = N$$

$$2m^2 = m^2 + 2 = m^2 + 2$$

$$2m^2 = m^2 + 2 = m^2 + 2$$

$$2m^2 = N' = m^2 + 2 = N'$$

$$P = -M \frac{\partial f}{\partial \xi} - \frac{1}{L} \frac{\partial f}{\partial \eta} - 3N' \frac{\partial^3 f}{\partial \xi \partial \eta^2} - 3N' \frac{\partial^3 f}{\partial \xi^2 \partial \eta}$$

$$f = \frac{1}{1 + \xi^2 + \eta^2}$$

$$f = \frac{1}{1 + \xi^2 + \eta^2}$$

$$f = \frac{1}{1 + \xi^2 + \eta^2}$$

$$f = \frac{1}{1 + \xi^2 + \eta^2}$$

$$\frac{\partial f}{\partial \xi} = -\frac{1}{R^2} \frac{d\xi}{d\xi} = -\frac{\xi}{R^3}$$

$$\frac{\partial^2 f}{\partial \xi^2} = -\frac{1}{R^3} + 3 \frac{\xi^2}{R^5}$$

$$\frac{\partial^3 f}{\partial \xi^3} = +3 \frac{\xi}{R^5} + 6 \frac{\xi^3}{R^5} - 15 \frac{\xi^5}{R^7}$$

$$\frac{\partial^2 f}{\partial \eta^2} = -\frac{1}{R^3} + 3 \frac{\eta^2}{R^5}$$

$$\frac{\partial^3 f}{\partial \xi \partial \eta^2} = \frac{3\xi}{R^5} - 15 \frac{\eta^2 \xi}{R^7} \quad \left| \quad \frac{\partial^3 f}{\partial \xi^2 \partial \eta} \right.$$

2.1

$$P = -H \frac{\partial \psi}{\partial x} = -H \frac{\partial}{\partial x} \left(\frac{1}{\sqrt{2}} e^{i(kx - \omega t)} \right)$$

$$= -H \frac{1}{\sqrt{2}} i k e^{i(kx - \omega t)} = -\frac{i H k}{\sqrt{2}} \psi$$

$$\langle P \rangle = \int_{-\infty}^{\infty} \psi^* \langle P \rangle \psi dx$$

$$\begin{aligned} \langle P \rangle &= \int_{-\infty}^{\infty} \psi^* \left(-\frac{i H k}{\sqrt{2}} \psi \right) dx \\ &= -\frac{i H k}{\sqrt{2}} \int_{-\infty}^{\infty} \psi^* \psi dx \end{aligned}$$

$$+ \frac{1}{2} \int_{-\infty}^{\infty} \psi^* \psi dx$$

$$\langle P \rangle = 0$$

$$= \langle P \rangle = \int_{-\infty}^{\infty} \psi^* \left(-\frac{i H k}{\sqrt{2}} \psi \right) dx$$

$$+ \frac{1}{2} \int_{-\infty}^{\infty} \psi^* \psi dx$$

$$= -\frac{i H k}{\sqrt{2}} A' - \frac{1}{2} A' = -\frac{1}{2} A'$$

$$\langle H \rangle = -H \left[\frac{\partial^2 \psi}{\partial x^2} \right] = -H \left[\frac{\partial^2}{\partial x^2} \left(\frac{1}{\sqrt{2}} e^{i(kx - \omega t)} \right) \right]$$

$$= -\frac{1}{\sqrt{2}} H \frac{\partial^2}{\partial x^2} e^{i(kx - \omega t)} = -\frac{1}{\sqrt{2}} H (-k^2) e^{i(kx - \omega t)} = \frac{H k^2}{\sqrt{2}} \psi$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = 0 \quad \frac{\partial \mathcal{L}}{\partial \mu} = 0$$

$$U = -M \left[-\frac{1}{2\epsilon} A' - \frac{2}{\epsilon^2} (A' - 1) \right]$$

$$= \frac{M}{\epsilon^2} \left[N \ln 2 - 2 \frac{M'}{2} \left(\frac{1}{2} \right) - \left(\frac{2}{M'} - \frac{1}{2} \right) \right]$$

comparing with the standard form

$$\frac{I}{\lambda} = \dots$$



$$\lambda = \frac{1}{2} \left[\dots \right]$$

the value of lambda is

$$P = -M \frac{\partial f}{\partial \lambda} - \frac{N}{2} \frac{\partial \mathcal{L}}{\partial \lambda}$$

$$U = -M \left[\frac{\partial \mathcal{L}}{\partial \lambda} A' - \frac{\partial \mathcal{L}}{\partial \lambda} (A' - 1) \right] + \frac{N}{2} \left[\frac{\partial \mathcal{L}}{\partial \lambda} \right]$$

$$+ \frac{\partial \mathcal{L}}{\partial \lambda} \left(\frac{1}{2} \right) + \frac{\partial \mathcal{L}}{\partial \lambda} \left(\frac{1}{2} \right)$$

the value of lambda is

$$P = \frac{1}{2} \rho v^2$$

$$P = \frac{1}{2} \rho v^2 = \frac{1}{2} \rho \left(\frac{v}{\lambda} \right)^2$$

$$P = \frac{1}{2} \rho v^2$$

$$P = \frac{1}{2} \rho v^2 = \frac{1}{2} \rho \left(\frac{v}{\lambda} \right)^2$$

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$$P = \frac{1}{2} \rho v^2 = \frac{1}{2} \rho \left(\frac{v}{\lambda} \right)^2$$

1.1

1.2

1.3

$$f(x) = \frac{1}{x^2} + \frac{1}{x^3}$$

$$f'(x) = -\frac{2}{x^3} - \frac{3}{x^4}$$

$$f''(x) = \frac{6}{x^4} + \frac{12}{x^5}$$

$$\frac{f''(x)}{f'(x)} = \frac{\frac{6}{x^4} + \frac{12}{x^5}}{-\frac{2}{x^3} - \frac{3}{x^4}} = \frac{6x + 12}{-2x - 3}$$

1.4

1.5

1.6

1.7

1.8

1.9

1.10

1.11

$$a \, dx \, dy \, dz = 11 \cdot X \cdot \pi$$

$$P = A \cdot f + B \cdot g + C \cdot h$$

$$A = \sum m_i \cdot v_i^2$$

$$\xi = x^2 + y^2$$

$$\eta = x^2 + y^2 + z^2$$

54

$$\eta = x^2 + y^2 + z^2$$

$$h = \frac{1}{2} \frac{d\eta}{dt}$$

$$\xi = x^2 + y^2$$

$$\eta = x^2 + y^2 + z^2$$

$$\eta = x^2 + y^2 + z^2$$

$$\frac{d}{dt} \left(\frac{1}{2} \frac{d\eta}{dt} \right) = \frac{1}{2} \frac{d^2 \eta}{dt^2} = \frac{1}{2} \frac{d^2}{dt^2} (x^2 + y^2 + z^2) = \frac{1}{2} \frac{d^2}{dt^2} (r^2) = \frac{1}{2} \frac{d^2}{dt^2} (r^2)$$

$$h = \frac{1}{2} \frac{d\eta}{dt} = \frac{1}{2} \frac{d}{dt} (x^2 + y^2 + z^2) = \frac{1}{2} \frac{d}{dt} (r^2) = \frac{1}{2} \frac{d}{dt} (r^2)$$

$$\frac{d^2 \eta}{dt^2} = \frac{d^2}{dt^2} (x^2 + y^2 + z^2) = \frac{d^2}{dt^2} (r^2) = \frac{d^2}{dt^2} (r^2)$$

$$h = \frac{1}{2} \frac{d\eta}{dt} = \frac{1}{2} \frac{d}{dt} (x^2 + y^2 + z^2) = \frac{1}{2} \frac{d}{dt} (r^2) = \frac{1}{2} \frac{d}{dt} (r^2)$$

$$h = \frac{1}{2} \frac{d\eta}{dt} = \frac{1}{2} \frac{d}{dt} (x^2 + y^2 + z^2) = \frac{1}{2} \frac{d}{dt} (r^2) = \frac{1}{2} \frac{d}{dt} (r^2)$$

$$\frac{d^2 \eta}{dt^2} = \frac{d^2}{dt^2} (x^2 + y^2 + z^2) = \frac{d^2}{dt^2} (r^2) = \frac{d^2}{dt^2} (r^2)$$

$$h = \frac{1}{2} \frac{d\eta}{dt} = \frac{1}{2} \frac{d}{dt} (x^2 + y^2 + z^2) = \frac{1}{2} \frac{d}{dt} (r^2) = \frac{1}{2} \frac{d}{dt} (r^2)$$

$$h = \frac{1}{2} \frac{d\eta}{dt} = \frac{1}{2} \frac{d}{dt} (x^2 + y^2 + z^2) = \frac{1}{2} \frac{d}{dt} (r^2) = \frac{1}{2} \frac{d}{dt} (r^2)$$

$$h = \frac{1}{2} \frac{d\eta}{dt} = \frac{1}{2} \frac{d}{dt} (x^2 + y^2 + z^2) = \frac{1}{2} \frac{d}{dt} (r^2) = \frac{1}{2} \frac{d}{dt} (r^2)$$

$$h = \frac{1}{2} \frac{d\eta}{dt} = \frac{1}{2} \frac{d}{dt} (x^2 + y^2 + z^2) = \frac{1}{2} \frac{d}{dt} (r^2) = \frac{1}{2} \frac{d}{dt} (r^2)$$

$$h = \frac{1}{2} \frac{d\eta}{dt} = \frac{1}{2} \frac{d}{dt} (x^2 + y^2 + z^2) = \frac{1}{2} \frac{d}{dt} (r^2) = \frac{1}{2} \frac{d}{dt} (r^2)$$

$$h = \frac{1}{2} \frac{d\eta}{dt} = \frac{1}{2} \frac{d}{dt} (x^2 + y^2 + z^2) = \frac{1}{2} \frac{d}{dt} (r^2) = \frac{1}{2} \frac{d}{dt} (r^2)$$

$$h = \frac{1}{2} \frac{d\eta}{dt} = \frac{1}{2} \frac{d}{dt} (x^2 + y^2 + z^2) = \frac{1}{2} \frac{d}{dt} (r^2) = \frac{1}{2} \frac{d}{dt} (r^2)$$



— from the ...
 ...

$abc =$



... ..

$-bct + bct$

$N = bct a -$

$= a b c t$

$t = a$

... ..

... ..



$N = a b c t$

... ..

... ..

$- a b c t$

$N = p c a$

$= \frac{p c a}{a b c}$

$\frac{p}{a b c} = \frac{p}{a b c} \cdot \frac{a b c}{a b c}$

1. Let $f(x) = x^2 + 2x + 1$
2. Let $g(x) = x^2 - 2x + 1$
3. Let $h(x) = x^2 + 1$
4. Let $k(x) = x^2 - 1$

5. Let $m(x) = x^2 + 2x$
6. Let $n(x) = x^2 - 2x$
7. Let $p(x) = x^2 + 2x + 1$
8. Let $q(x) = x^2 - 2x + 1$

$$\frac{d}{dx} (x^2 + 2x + 1) = 2x + 2$$
$$\frac{d}{dx} (x^2 - 2x + 1) = 2x - 2$$
$$\frac{d}{dx} (x^2 + 1) = 2x$$
$$\frac{d}{dx} (x^2 - 1) = 2x$$

$$\frac{d}{dx} (x^2 + 2x) = 2x + 2$$
$$\frac{d}{dx} (x^2 - 2x) = 2x - 2$$
$$\frac{d}{dx} (x^2 + 2x + 1) = 2x + 2$$
$$\frac{d}{dx} (x^2 - 2x + 1) = 2x - 2$$

$$- \left(\frac{d}{dx} (x^2 + 2x + 1) - \frac{d}{dx} (x^2 - 2x + 1) \right) = 0$$
$$= \left(\frac{d}{dx} (x^2 + 2x + 1) - \frac{d}{dx} (x^2 - 2x + 1) \right) = 0$$

20/10

1. The...

✓ ...

2. The...

$$a) \frac{u_1 - u_2}{l} \cdot k \cdot t \quad k = \frac{C_p \cdot \rho}{l}$$

2. The...

2. The...

2. The...

2. The...

2. The...

$$N = \frac{u_1 - u_2}{l} \cdot k \cdot t \quad k = \frac{C_p \cdot \rho}{l}$$

$$= k \cdot q \cdot \frac{u_1 - u_2}{l} \cdot t \quad u_1 = f(x) \quad \frac{u_1' - u_2}{l} = f'(x) = \frac{dx}{dx}$$

$$u_2 = f(x + l)$$

$$= k \cdot q \cdot \frac{dx}{dx} \cdot t$$

$$= - \frac{dx}{dx} \cdot t$$

$$i_1 = \frac{1}{n_1} = \frac{1}{n_1}$$

$$i_2 = \frac{1}{n_2} = \frac{1}{n_2}$$

$$\frac{1}{n_1} = \frac{1}{n_2}$$

$$\frac{1}{n_1} = \frac{1}{n_2}$$

$$\frac{1}{n_1} = \frac{1}{n_2}$$

23/3

... ..

... ..

... ..

11

[Faint handwritten notes or bleed-through from the reverse side]

$\frac{1}{2}c\sqrt{A\bar{A}}$ in m. s.]

68. 1911 (1911)

Cont. 8 1/2 - 1000.

d. l. c.

in abn. ...

ac h/c 2 1 20

K is A

$\frac{1}{2}$

$\frac{m}{2}$

$m \approx 1$

$$\frac{\sum \frac{1}{n^2}}{\sum \frac{1}{n^2}} = \frac{\sum \frac{1}{n^2}}{\sum \frac{1}{n^2}} = \frac{\sum \frac{1}{n^2}}{\sum \frac{1}{n^2}}$$

$$= \frac{2 \sum \frac{1}{n^2}}{2}$$

for $n \rightarrow \infty$ P.C.

$$1 = \frac{2 \pi}{2}$$

$n \rightarrow \infty$

$$n \rightarrow \infty$$

What is

for $n \rightarrow \infty$

$\frac{m}{2}$

or $n \rightarrow \infty$

$\frac{1}{2} < n \rightarrow \infty$



$$H m \frac{1}{2} \frac{1}{n^2}$$

$$\frac{1}{2} \frac{1}{n^2}$$

$$H m \frac{1}{2} \frac{1}{n^2}$$

$$\frac{1}{2} \frac{1}{n^2}$$

$$H m \lambda \sin \alpha = \lambda \frac{1}{n^2}$$

$$= \frac{2 \pi \sin \alpha}{n} \lambda \frac{1}{n^2}$$

$$f = \frac{1}{2\pi} \frac{d\phi}{dt}$$

$$i = \frac{1}{2\pi} \frac{d\phi}{dt} \quad \text{if } \phi = 2\pi f t$$

As soon as the current is

$$i = 1 \quad \text{if } \phi = 2\pi f t$$

$$i = 1 \quad \text{if } \phi = 2\pi f t$$

$$i = 1 \quad \text{if } \phi = 2\pi f t$$

$$i = 1 \quad \text{if } \phi = 2\pi f t$$

$$i = \frac{1}{10} = 0.1 \text{ ampere}$$

$$i = 10 \frac{1}{2\pi} \frac{d\phi}{dt} \quad \text{if } \phi = 2\pi f t$$

$$i = 10 \frac{1}{2\pi} \frac{d\phi}{dt} \quad \text{if } \phi = 2\pi f t$$

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Chapman

W 4.10 at

24/3

Indication

Farach

2

L. K...

11

12

13

14

15

22 mid i us g

$$m = 11$$

$$\sqrt{\dots}$$

$$\frac{2\pi M}{h} \dots = \dots$$

$$= \dots$$

$$\dots = \frac{2\pi M}{h} \dots$$

$$\dots$$

$$\dots$$

$$\dots = \frac{1}{h} \dots$$

$$\dots$$

$$I \dots$$

$$\dots$$

$$K \frac{d^2}{dt^2} = -MH \dots - \frac{2\pi M}{h} \dots$$

$$\dots = \frac{2\pi M}{h} \dots$$

$$i = \frac{2\pi M}{h} \dots$$

$$K \frac{d^2}{dt^2} = -MH \dots - \frac{4\pi^2 M^2}{h^2} \dots$$

$P = \dots$
 \dots

$$K = \dots = \frac{\dots}{\dots}$$

\dots
 \dots
 \dots

$$\frac{1}{\dots} = \dots$$

\dots
 \dots

\dots

\dots
 \dots

\dots

$$10^7 \text{ ...} = 1 \text{ ...} = \dots$$

\dots

$$10^8 \cdot 10^6 = \dots$$

$$10^8 = \dots$$

$$= \frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4}$$

$$\frac{1}{16} = \frac{1}{4} \cdot \frac{1}{4}$$

$$= \frac{1}{4} \cdot \frac{1}{4} = \frac{1}{16}$$

$$= \frac{1}{4} \cdot \frac{1}{4} = \frac{1}{16}$$

$$= \frac{1}{16}$$

$$= \frac{1}{16} \cdot \frac{1}{4} = \frac{1}{64}$$

$$735 \text{ m.} = 15 \text{ km.}$$

$$= \frac{1}{4} \cdot \frac{1}{4} = \frac{1}{16}$$

$$= \frac{1}{4} \cdot \frac{1}{4} = \frac{1}{16}$$

$$= \frac{1}{4} \cdot \frac{1}{4} = \frac{1}{16}$$

